

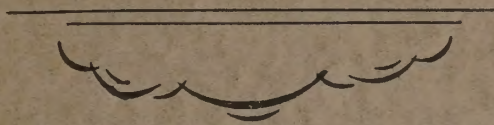
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1935-36

PASTURE BOOK



F. H. Brunning Pty. Ltd.

57 ELIZABETH STREET, MELBOURNE

BRUNNING'S

1935-1936

PASTURE BOOK



Brunning's Seeds have a reputation of over 83 years for
"Value, Strain and First Class Quality."

The business of F. H. Brunning Pty. Ltd. was founded in 1852 by the late William Adamson, purchased by the late George Brunning in 1889, and taken over by the late F. Hamilton Brunning. On his death, the business was formed into a Proprietary Company, first functioning as such in February, 1906.

F. H. BRUNNING PTY. LTD.

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3rd Floor, Melbourne Sports Depot Bldgs.

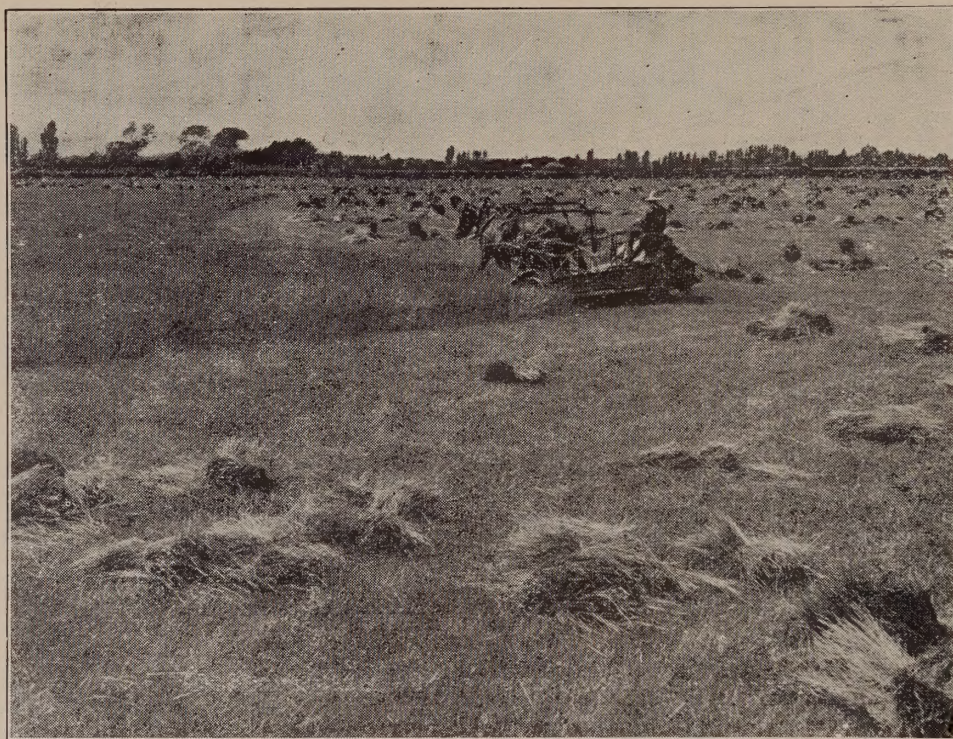
57 ELIZABETH STREET, MELBOURNE, C.1

BRUNNING'S FARM AND VEGETABLE SEEDS

Although this booklet is primarily intended to be of an informative rather than of Catalogue nature, the following list of Farm and Vegetable Seeds sold by us will facilitate readers in making enquiry as well as in selecting their requirements. As the present issue will be in force for at least two years, owing to the fact that rates for farm seeds are so liable to fluctuation, it is not feasible to include any prices, but **quotations will gladly be submitted and information given at all times.** No charge is made for service of this description and advice is given free of charge.

When writing for quotations **please indicate** your approximate requirements, specifying what sort or sorts, as well as the likely quantities of each. In many items there is more than one quality available, but Brunnings recommend the "best" as being the cheapest (not necessarily the lowest priced) at all times.

Value, not price, is the first consideration when buying Farm and Vegetable Seeds. See remarks on **page 51.**



Harvesting "Certified" Hawkes Bay Ryegrass for Seed.

GOVERNMENT CERTIFIED PASTURE SEEDS

To have definite and effective value, Certified Pasture Seeds must be those "certified" to under an **efficient Government Scheme** providing for close and thorough supervision, testing of strain purity and certain assurance that the actual seed is as represented. For fuller information, see the article on Certified Pasture seeds on pages **33 to 40.**

New Zealand Perennial Ryegrass of the Hawkes Bay type.

New Zealand Cocksfoot of the Akaroa type.

New Zealand White Clover of a permanent and leafy type.

New Zealand Brown Top certified free from Red Top.

New Zealand grown Italian Ryegrass of selected strain.

New South Wales Certified Phalaris Tuberosa (perennial type).

As commercial supplies are available, the other Pasture Seeds under Government Certification Schemes as shown on page **35**, will also be carried in stock. For details of "Standards," etc., please refer to the explanation on page **35.**

RYEGRASSES

Irish Short-seeded "Ben," **32/33 lb.**

Irish, Perennial, **27/28 lb.**

Victorian Western District

Italian (Annual)

Hawkes Bay "Certified" Perennial
N. Zealand "Sth. Island" Perennial
Special Old Pasture Victorian
Westernwolths (Annual)

GENERAL PASTURE GRASSES

Cocksfoot, Genuine "Akaroa"	Creeping Bent or Red Top
Cocksfoot, New Zealand Grown	Browntop or Colonial Bent
Cocksfoot, Danish Grown	Crested Dogstail
Couch Grass (Cynodon Dactylon)	Chewing's Fescue
Kentucky Blue Grass	Paspalum Dilatatum
Phalaris Tuberosa (syn. Bulbosa)	Rib or Plantain Grass
Prairie or Rescue Grass	Rhodes Grass
Tall Oat Grass	Rough Stalked Meadow Grass
Wallaby Grass, Pilosa	Timothy Grass
Wallaby Grass, Semi-Annularis	Yorkshire Fog Grass

CLOVERS

Alsike Clover	Suckling Clover
Burr Clover (Native Trefoil)	Clustered Clover
Cowgrass, Prime Imported	Crimson or Italian Scarlet Clover
Cowgrass, New Zealand	English Trefoil or Black Medick
Brunning's Genuine Giant Colonial Cowgrass	Lotus Major (Greater Birdsfoot Trefoil)
Perennial Red Clover	Lotus Hispidus (Boyd's Clover)
"Tarwei" Strawberry Clover	Sheep's Trefoil
Subterranean Clover, Mt. Barker type	Sweet or Bokhara Clover
Subterranean Clover, Extra Early	White Dutch Clover, Imported
Dwalganup	New Zealand White Clover
	"Mesgawi" Berseem Clover

GIANT UPRIGHT BROADLEAF HUNTER RIVER LUCERNE

(Brunning's Specialty)

This seed is usually stocked in three regular grades of quality; for fuller details of which please refer to pages 55 to 61.

(a) "STANDARD A.1."	Triple Machine Dressed.
(b) "SUPERGRADE"	Double Machine Dressed.
(c) "PRIME"	Once Machine Dressed.

ANNUAL SUMMER FODDERS

Sudan Grass, Genuine "Garawi"	Hungarian Millet
Sudan Grass, Victorian M/D	Japanese Millet, Machine-dressed
Ambercane	Imphee or Planter's Friend
Saccaline Sorghum	Cow Peas

CATTLE PUMPKINS

Ironbark	Crown
Triamble	Turk's Cap

GRAINS

Cape Barley	Dun Field Peas
Skinless Barley, White-seeded	Partridge or Maple Field Peas
Skinless Barley, Black-seeded	Ryecorn
Tick or Horse Beans	Tares or Vetches
Algerian Oats	Maize
White Tartarian and all other General Purpose Oats.	

ROOT CROPS

Mangel, Mammoth Long Red	Giant Half Sugar Mangel, White
Mangel, Champion Yellow Globe	Giant Half Sugar Mangel, Rose
Swede, Champion Purple Top	Field Carrot
Swede, Elephant Purple Top	Turnip, Purple Top Mammoth
Swede, Skirving's Purple Top	Turnip, Purple Top Yellow Aberdeen
Swede, Bangholm Purple Top	Turnip, Imperial Green Globe
Swede, Superlative	Turnip, Purple Top White Globe
	Swede, Tipperary

BRASSICAS

Thousand-headed Kale	Chou Moellier
White Mustard	Giant Kangaroo Rape
Holland Grown and English Grown Dwarf Essex Rape.	

MISCELLANEOUS FARM SEEDS

Silver Beet, Plain Leaved
Linseed or Flax
Canary Seed, Plain or Mixed
Johnson Grass
Sheep's Burnet

Silver Beet, Lucullus Curled
Japanese Buckwheat
Broom Millet
Sunflower, Black and Grey
Peanuts for Sowing

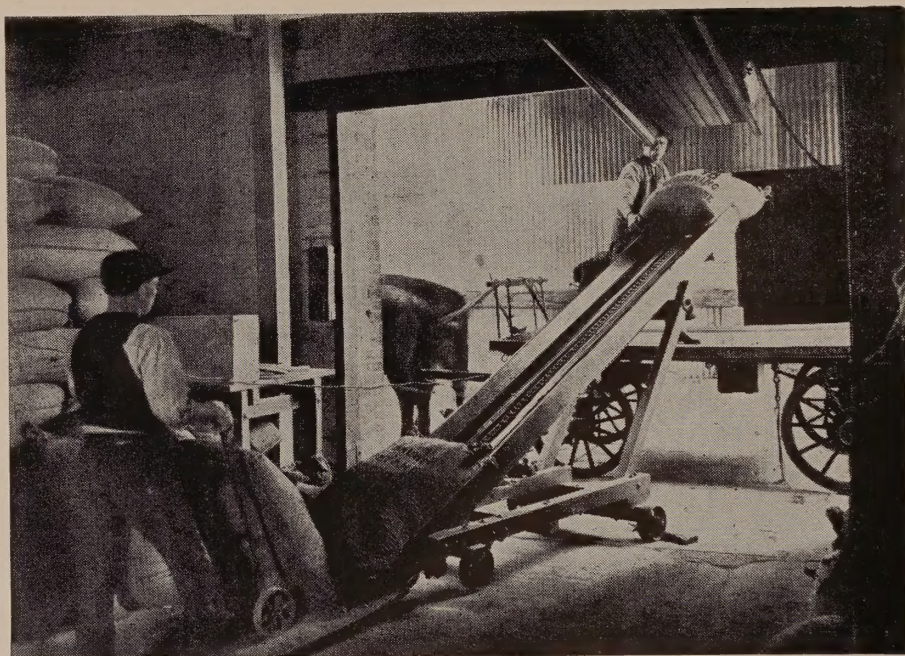
Panicum

VEGETABLE SEEDS

We shall be glad to procure any lines of Vegetable Seeds not kept in stock and to send on as purchased, but such items will be bought in solely to meet the buyer's convenience and without any responsibility on our part.

Broad Bean, Longpods
French Bean, Perfect Bush

Lettuce, Iceberg
Lettuce, New York Improved



Some of the quick loading facilities at Brunning's New South Melbourne Stores.

French Bean, Afrikander
French Bean, Epicure Runner
French Bean, Canadian Wonder
French Bean, Magnum Bonum
French Bean, Startler Butterwax
French Bean, Kentucky Wonder
French Bean, Feltham Prolific
French Bean, Pale Dun
French Bean, Scarlet Runner
Beet, Red, Crimson Globe
Beet, Red, Egyptian Turnip
Beet, Red, Early Blood Turnip
Beet, Silver, Plain-leaved
Beet, Silver, Lucullus Curled
Cabbage, Enfield Market
Cabbage, Succession
Carrot, Chantenay
Carrot, Intermediate
Carrot, St. Valery
Carrot, Short Horn
Cauliflower, Eclipse
Cauliflower, Early Greenleaf

Lettuce, Webb's Wonderful
Lettuce, Drumhead or Malta
Onion, Brown Globe
Onion, White Queen
Onion, White Globe
Onion, Odorless
Onion, Brown Spanish
Parsnip, Hollow Crown
Pea, English Wonder
Pea, Daisy
Pea, Day's Early Sunrise
Pea, Dwarf Defiance
Pea, The Lincoln
Pea, Greenfeast
Pea, Richard Seddon
Pea, Te Aroha
Pea, Stratagem
Pea, William Hurst
Pea, Yorkshire Hero
Radish, Icicle
Radish, French Breakfast
Radish, Long Scarlet

For prices of Vegetable Seeds in $\frac{1}{2}$ lb. and 1 lb. lots as well as for Peas and French Beans in $\frac{1}{4}$ bush., $\frac{1}{2}$ bush. and one bushel parcels, write to Brunning's "Service" Dept., Box 857.K., Melbourne, C.1.

BRUNNING'S TERMS OF BUSINESS

(All goods are supplied on these terms.)

ORDERS:—The very best personal care and attention is given to every order, be it large or small, simple or intricate, so that under reasonable conditions, the goods must prove satisfactory to clients and a credit to the firm. Although all enquiries and orders receive prompt attention and deliveries are effected as speedily as circumstances of the season permit, clients are requested to co-operate in facilitating prompt despatch and eliminating the possibility of errors by **writing all orders on a separate sheet of paper** from general letters containing enquiries, and **to write all addresses and signatures fully and clearly**. Please indicate the nearest Railway Station or Shipping Port when goods are to be sent by rail or boat.

QUALITY:—The reason that Brunning's Seeds have always been so satisfactory may be summed up in the one word "**Selection**." The past high quality of Brunning's Seeds has been fully maintained and every care taken in the "**selection**" and "**testing**," not only for germination but for strain, quality and production, so that the highly-prized reputation gained and upheld during the **past 83 years** may be kept at the same high level.

PRICES:—As owing to the dependency of seed crops on weather conditions, rates are liable to fluctuate, **quotations will be submitted** as required on application, and **no prices are included in this Handbook**, which is issued merely as a list of goods sold by us. **Clients are requested**, when enquiring for prices, to submit their **approximate requirements** and quantities thereof.

TERMS OF PAYMENT:—Unless otherwise specified at time of sale and marked on the invoice, **all goods are sold on the basis of Monthly Account**, i.e., goods supplied during one month are due for payment on the 28th of the succeeding month. All quotations are made on a **Strictly Nett Cash basis** and either f.o.r. or f.o.b., Melbourne.

SACKS, BAGS & CASES:—All sacks, bags, cases, etc., are charged at cost. With the exception of Grain, all **seeds are charged at nett weight**, the tare of the sacks being allowed and the packages being charged extra. Sacks, bags and cases **returned within 14 days** from the date of invoice, **freight prepaid to Melbourne**, will be **credited at two-thirds** the amount invoiced, providing they are received in good order and condition.

REMITTANCES:—Payments may be made by cheque (Crossed and marked "Not Negotiable"), Bank Draft, Postal Note or Post Office Order, or for small amounts, postage stamps of the Commonwealth of Australia will be accepted. New Zealand, Fijian and other oversea clients are requested to remit by Bank Draft or Post Office Order and not by stamps or postal notes, which are not negotiable in Australia. Exchange must be added to all country and interstate cheques, the rates being 6d. for Victoria and 1/- for Interstate.

COMPLAINTS:—If clients consider they have any cause for complaint, kindly **notify us immediately**. If we are at fault, we make adjustment promptly as our desire is to give "**Satisfaction**" at all times. If you don't let us know when you feel everything is not quite satisfactory, it is impossible for us to put things right.

No complaints can be recognised unless made within 14 days from date of invoice, as after that time it is often impossible to thoroughly trace same back.

NEW CLIENTS:—New clients are requested to either **forward cash** with their orders, or **give the name of a reputable Melbourne firm as reference** to their financial standing. Where it is not possible to give the name of a Melbourne business house for this purpose, please **submit your bankers**.

GOODS TRAIN CONSIGNMENTS:—The attention of clients is directed to the fact that under the "nominated days of loading system" now in force on the Victorian Railways, **goods are only accepted for despatch to country stations on certain days** and at specified times.

Clients are recommended to **make themselves acquainted with the specified loading days** and to send their orders accordingly to prevent a delay arising over which we have no control.

DAMAGE IN TRANSIT:—All goods are delivered to rail or boat properly and securely packed, and it is understood that **after receiving a receipt** from the Shipping Company or the Victorian Railways for delivery in good order and condition, our **liability for any damage, loss or miscarriage ceases**. To ensure safety in transit as well as recompense from the Railways for any damage that may occur, **All Consignments per Goods Train** are now forwarded at "**Commissioner's Risk**," by which the Railways accept the same liability as any common carrier. If goods are required at "**Owner's Risk**," please **stipulate** at time of ordering. The Extra Freight involved by the "**Commissioner's Risk**" is very little more, while the extra protection is well worth same.

SERVICE:—No charge is made for information or quotations. All those interested in laying down pastures, either temporary or permanent, or in the planting of other fodders, are requested to write for advice.

F. H. BRUNNING PTY. LTD.

1st March, 1935.

PERMANENT PASTURES OF GRASSES AND CLOVERS

Part One.—Their Value and Utility.

The expression **"Permanent Pasture"** really means those fodder plants suitable for grazing which are truly perennial, i.e., which once sown down will grow on for a lengthy period of years without the necessity of again sowing seed. With the increasing use of selected mixtures of Grasses and Clovers, this term is now understood also to refer to such pastures laid down for a period of years as against those sown down for one or two years only and of which Italian Ryegrass, Crimson Clover, Berseem Clover are perhaps the best known examples.

This article deals with "Permanent Pastures" in the sense of mixtures of Grasses and Clovers of truly permanent strain, carefully and scientifically made up to suit the soil (and in the absence of irrigation facilities), the annual rainfall of the particular locality wherein they are to be grown.



The advantage of "Strain." Permanent Pasture at Ngakuru Demonstration Farm, New Zealand, Three Years' Old. Note the predominance of Perennial Ryegrass, Cocksfoot, White Clover and Cowgrass. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Department of Agriculture.

"Strain" is all important in Pasture Seeds. Read the article on pages 33 to 40.

The efficient use of every square yard of land on a comparatively high-priced holding is essential if the property is to be worked on a profitable basis, and in this direction, the valuable features of "Permanent Pastures" are a most important factor. Their advantages may be summarised as follows:—

1. They can be so selected as to provide **"All-the-Year-Round"** pasture.
2. The stock-carrying capacity of the land is increased.
3. Being grazed, labor involved in cutting is eliminated, thereby reducing expense.
4. Cultivation being unnecessary, they are economical in upkeep.
5. The best and deepest soil is not necessary, as with Lucerne.
6. Hoven or Bloat need not be feared.
7. As natural manure, the produce absorbed by the stock is put back on the land.
8. The grasses and clovers provide a more balanced ration than Lucerne alone.
9. They are the best and most natural feed for milch cows.
10. The milk yield is free from taint, besides being rich in butter fat.
11. Properly treated and at very little expense, the pastures are thoroughly permanent.
12. A grass and clover pasture in good condition appreciably increases the capital value of the holding.

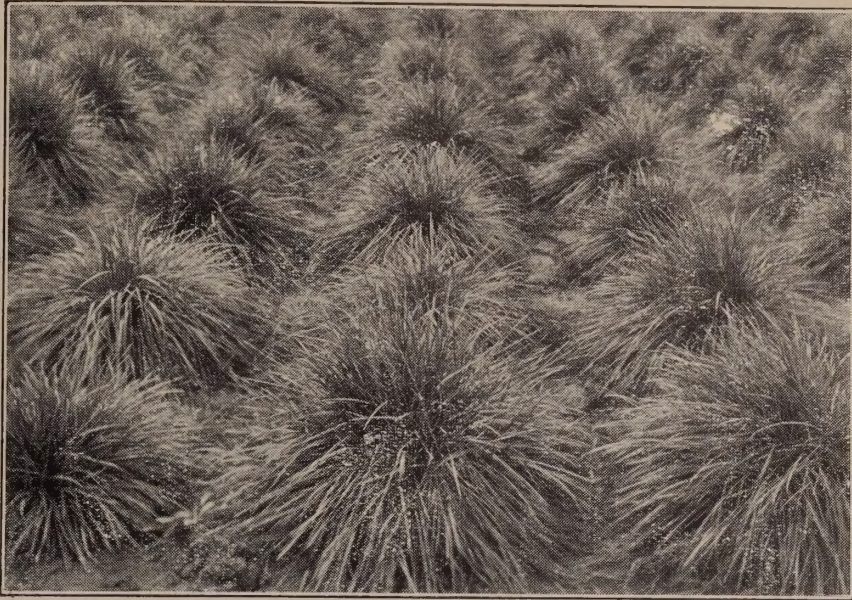
The use of a mixture permits the inclusion of various grasses and clovers, which, while growing well together in association, mature at various periods, so that by using discrimination in making up the mixture, the pasture may be made available (apart from the spelling necessary between grazings) for **practically the whole twelve months** of the year, hence the expression **"All-The-Year-Round"** so truly descriptive and appropriate.

GRASS AND CLOVER PASTURES (Continued).

CARRYING CAPACITY:—On a property comprising tens of thousands of acres, where the actual stock-carrying capacity is not a very vital matter, the natural grasses may be relied on, but **with a limited area**, where it is necessary to carry several beasts to the acre to make the property a profitable transaction, a permanent pasture mixture not only increases the carrying capacity, but also the value of the holding, and while the pasture may if desired be occasionally cut for hay it is generally utilised for grazing, and thus the labor involved in cutting is eliminated and the expense considerably reduced; or, in other words, in a properly laid down permanent pasture the stock can be made to do the work.

ECONOMICAL UPKEEP:—Once the pasture has been laid down **cultivation is unnecessary**, so that the **upkeep is economical**, and as the highest quality and deepest soil is not essential for Grasses and Clovers, there are no limits to the area that may be sown down.

LUCERNE:—When climatic conditions permit or where irrigation is available, first-class, deep soil suitable for Lucerne should be sown down with the "King of Fodders," and it is not at any time suggested that Grasses and Clovers should supersede Lucerne on true Lucerne country.



Single plants of N.Z. Government "Certified" Perennial Ryegrass, one year old, showing dense leafy nature and high persistency. Compare with illustration on page 9. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

BLOAT:—With the ingredients scientifically and properly balanced, so that the right proportion between the Grasses and Clovers is preserved, there need be no fear of hoven or bloat, and furthermore, the produce absorbed by the stock is returned to the land in the shape of manure.

ESSENTIALS TO SUCCESS:—The many material **advantages** to be derived from any Permanent Pasture **will depend on its proper establishment** in the first place, **together with careful common-sense methods of management** after the Pasture has been laid down and has reached the state of productivity. The methods of laying down and maintaining a Permanent Pasture to secure the maximum results will be dealt with later, but a few words on the most common causes of disappointment, and one might even add failure, will not be out of place here. These may be briefly summed up as follows:—

- (a) **Sowing unsuitable varieties or strains.**
- (b) **Neglect to provide adequate drainage to remove excess moisture.**
- (c) **Using a mixture of Grasses and Clovers unsuited to the particular conditions.**
- (d) **Sowing on land that is "dirty" or weed-infested.**
- (e) **Using ground "worn out" by continuous cropping without proper preparation and adequate manuring.**
- (f) **The use of low grade seed, both as regards Purity and Germination.**

IMPORTANCE OF STRAIN:—The primary producer now fully recognises that "**Strain**" in Pasture Plants is even more important than "blood" in sheep, horses, cattle or other stock. The efficient farmer will not tolerate poorly bred stock and will generally want to **know the pedigree** (i.e., blood); but it is only within the last year or two that the same man has come to appreciate the fact that "**price**" is the **least consideration** when buying Pasture Seeds and that the essential factors are firstly the "**Strain**" and secondly the "**Quality**," i.e., the Purity and Germination.

A comparison of **prices is no criterion to "value"** without full knowledge of the "strain" and the analysis, i.e., the actual purity and germination as reported by a reliable Seed Testing Station.

GRASS AND CLOVER PASTURES (Continued).

THE BEST STRAINS:—It is here that one may remark on the necessity of sowing only highly-persistent and the most productive strains of plants. Different species of Cocksfoot and Perennial Ryegrass, for example, vary very considerably in their production of leaf to stem, and as the leaf is the richest and most nutritious portion of the plant, the value of leafy strains which are, especially with Cocksfoot and Perennial Ryegrass, the most persistent (or permanent) will be fully realised and their importance for pasturing purposes thoroughly appreciated. In Cocksfoot, allowing for very slight variations, there are over one hundred species, but that great authority on this plant, Professor Stapledon, has grouped all these Cocksfoots into four distinct classes:—

1. With more leafage than stem.
2. Inferior to No. 1, but of the same type, the leafage still predominating.
3. A slightly greater percentage of stem than leafage.
4. Stem very much greater than leaf.

The highest and most productive type in the four leading Pasture Plants for Australian conditions, viz., **Perennial Ryegrass, Cocksfoot, White Clover** and **Phalaris Tuberosa** is now definitely obtainable. In the first three, **No. 1 type** is represented by New Zealand Government Certified Hawkes Bay Strain Perennial Ryegrass, Akaroa Cocksfoot and the special Certified Strain of New Zealand Old Pasture White Clover, the latter strain being even more valuable and better adapted to Australian conditions than the Kentish Wild White Clover. In **Phalaris Tuberosa**, the **No. 1 type** is now obtainable in the N.S.W. Government Certified genuine truly perennial strain as sent out by **Brunnings**. The certifying of **Phalaris Tuberosa** by the N.S.W. Agricultural Dept. was an important step in the right direction. See also the article on Certified Pasture Seeds on pages 33 to 40 for information on this subject.



Rotational grazing near Colac, on Mr. G. C. Howey's farm at Swan Marsh.

The second class, **No. 2 type**, embraces New Zealand Akaroa and Plains Cocksfoot (uncertified seed), short-seeded Irish Perennial Ryegrass, New Zealand White Clover (uncertified), as compared with the Polish White Dutch Clover imported from Europe as well as some of the strains of Victorian Perennial Ryegrass seed.

Types 3 and 4 should only be sown where it is intended to lay down a temporary pasture, and in some instances are really only suitable for seed production, their feeding value, owing to the less nutritious quality of the herbage produced, being much lower than that of types 1 and 2. Even for temporary pastures, owing to the higher and better feeding value realised, it is usually **more economical to sow** strains of the highest class, type No. 1, or at the very least, those of type No. 2. The imported **Danish Cocksfoot** may be regarded as belonging to **type No. 4** and its use should be discouraged where a permanent pasture of high production value is required. The **initial cost** of the seed is **so small** compared with the resultant advantages that it is unwise policy to make a small saving in first outlay in this direction and to incur a much bigger loss later on when the pasture is to be utilised.

SPECIES:—The Grasses and Clovers most suitable for first-class land are the high productivity plants—Perennial Ryegrass, Cocksfoot, **Phalaris Tuberosa**, White Clover and "Tarwei" Strawberry Clover. To suit certain conditions, Cowgrass, Alsike and Timothy Grass are sometimes included in mixtures under such conditions. The other Grasses and Clovers most generally included in these mixtures comprise Subterranean Clover, Clustered Clover, Sheep's Trefoil and *Paspalum Dilatum*.

The lower production Grasses suitable for second and third class land include Crested Dogtail, Creeping Bent, Brown Top (especially valuable on poor land in New Zealand), Kentucky Blue Grass, Wallaby Grass (*D. Pilosa*) and Yorkshire Fog Grass. The difference between the higher production Grasses and Clovers and those of lower yielding powers cannot be too strongly emphasised and must be given careful consideration when making up a mixture for any particular set of conditions.

GRASS AND CLOVER PASTURES (Continued).

MAKING UP THE MIXTURE:—The species of grasses and clovers to be included in any particular mixture and the quantities of each are governed primarily by the soil conditions under which the pasture is to be grown, and secondly by the annual average rainfall (or facilities for irrigation), and these factors must be carefully considered when determining the mixture to be sown.

Some Grasses and Clovers are only suitable for first-class soil under high rainfall or irrigation conditions, while others will give their maximum results on second or third class country. Some are high production plants which require rich soil to yield such production, while it would be a waste of good land to include others, in so much as they will give equally satisfactory returns on second or third grade country. Care is therefore very essential in making up a suitable mixture.

While *Paspalum Dilatum* is an excellent pasture plant for certain conditions, **on no account should it be included** in mixtures which are to be laid down **under irrigation**, on account of the danger of spreading and becoming a pest in adjoining paddocks and properties where it may not be wanted.

The Seed of *Paspalum Dilatum* is liable to be carried on irrigation waters into other established pastures or Lucerne fields, and under such conditions, it may easily become a very serious pest, even to the extent of killing out and ruining such pastures.



Single plants of FALSE PERENNIAL or ORDINARY N.Z. RYEGRASS, one year old. Note the mixture of types, poor recovery after cutting and low persistency. Compare with the illustration on page 7. Photo. kindly supplied at our request by Mr. E. Bruce Levy. N.Z. Dept. of Agriculture.

PRAIRIE GRASS:—Although Prairie Grass is a high production plant and one of our best Winter Permanent Pastures, **it is not suitable** for sowing in mixture with other Grasses and Clovers as owing to its extremely high palatability, stock (especially horses) are liable to eat the Prairie right out while neglecting the other ingredients in the pasture. See also article on page 24.

CLEAN GROUND:—The importance of clean ground cannot be overstated when laying down land to Permanent Pasture, and it must be remembered that the competition from weeds may be serious enough for the first year or two on land which seems to be reasonably clean, but where thorough cleaning prior to sowing down has been neglected or was practically impossible owing to conditions not permitting, there is a real danger of the weeds gaining the upper hand before the cultivated Grasses and Clovers are able to establish themselves.

WEEDS:—To emphasise the importance of first getting rid of the weeds, it is only necessary to review the bad points of these unwelcome strangers. The following brief summary will suffice:—

1. Weeds occupy space which should be filled by useful plants.
2. In addition to screening off light and air, they deprive the crop of various manurial constituents.
3. Being harvested with crops, they depreciate the value of same.
4. Some weeds, such as Dodder and Mistletoe, are parasitic, and do not derive their sustenance from the soil and air. They thus materially weaken the crop.
5. They are a harbour for insects and other pests. The danger is due to neglecting to apply insecticides or fungicides to weeds, which thus form a nursery for pests.

Part Two.—How to Lay Down and Maintain.

ECONOMICAL TO ESTABLISH:—One great advantage in laying down a permanent pasture mixture of Grasses and Clovers is that the **preparation of the land** is a **much less costly** operation than for Lucerne and other crops. Deep ploughing and thorough sub-soiling, a second ploughing, harrowing and rolling, grading, and the provision of adequate drainage facilities are essential with Lucerne, whereas the **special virtue of Grass and Clover pastures** is that **shallow soil and even gravelly country**, where deep-rooting pastures could not thrive, **may be advantageously utilised**, while the capability of Grasses and Clovers to withstand surface moisture permits their use in situations where Lucerne would be drowned out.



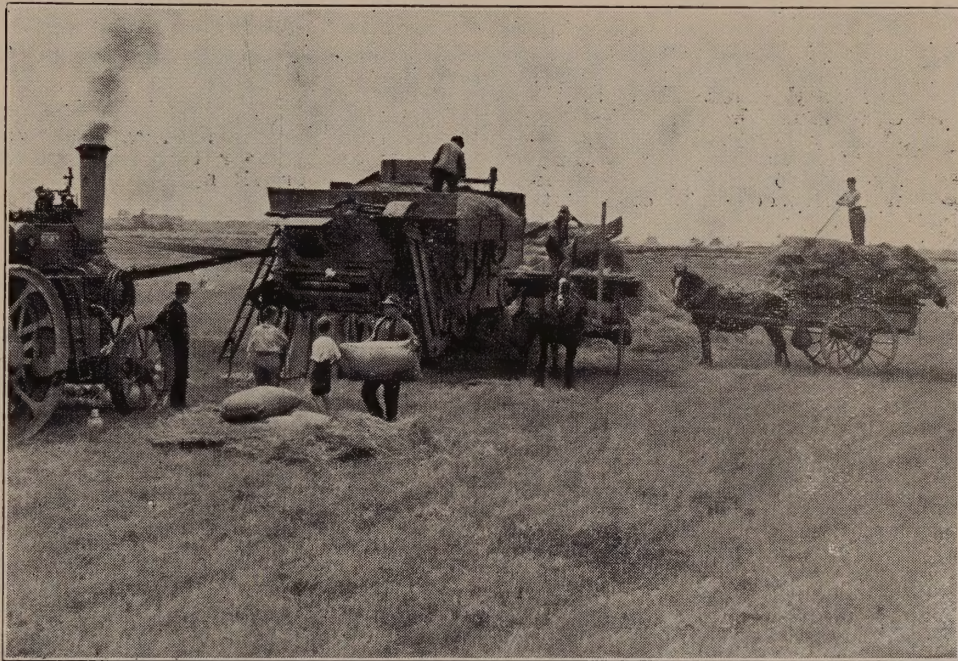
“Service and Satisfaction” are the keynote of the policy laid down by F. H. Brunning Pty. Ltd. It is on these lines combined with “Quality” and “Value” that the business has been built up during the past 83 years. See also notes on “Value” on page 51.

ESSENTIAL OPERATIONS:—The operations necessary for the successful establishment of Grass and Clover Pastures, with or without irrigation facilities, as well as the subsequent treatment essential to the maintenance of the highest productivity, may be briefly summarised as follows:—

1. Liming the ground where necessary.
2. Proper soil preparation to provide a fine, firm, level, shallow seed bed.
3. The use of fertiliser, natural manure for preference.
4. Sowing as early as possible after the first Autumn rains.
5. Care to avoid sowing too deeply.
6. A light rolling after sowing to compact the seed and soil.
7. Using a mixture suitable to the soil and climatic conditions.
8. Sowing thickly only the very best quality seeds, both as regards strain, growth and purity.
9. Prevention of surface caking of the soil and checking of excessive evaporation of moisture.
10. Judicious grazing in the early stages to achieve the objects of No. 9.
11. Keeping the pasture from seeding itself during the first year.
12. Judicious grazing and rotation, which means fencing off into small paddocks.
13. Top-dressing the pasture every Autumn.

GRASS AND CLOVER PASTURES (Continued).

THE NEED FOR LIME:—Bear in mind that **Lime is one of the necessary plant food constituents**, consequently, it must be in any soil from which it is expected to produce crops. Lime also tends to liberate from its insoluble forms of combination another essential plant food substance in Potash, and thus converts it into a condition in which it is readily available to the plant as food. Lime is also an essential constituent for the development of the micro-organisms which bring about the formation of nitrates in soils, and it is also necessary to neutralise the acids that are naturally formed in the process of decay of the organic matter present in soils. It will thus be realised that **Lime has a very important function to perform**. Very often soil is over-provided with rich plant food locked up in an insoluble condition. The application of further fertiliser only tends to aggravate the position, but a dressing of Lime, as previously stated, will liberate the plant food from its insoluble forms of combination and convert ground which is very often sterile into rich country without any additional manure being required. See also the remarks on "Lime" on page 29.



Threshing "Certified" Hawkes Bay Perennial Ryegrass for Seed.

For Permanent Pasture, sow Government "Certified" Pasture Seeds. They are the best "Value" from a first cost, high production and permanency stand-point. See pages 33 to 40.

SOIL PREPARATION:—For many years, the general practice when laying down grass and clover pastures has been to plough the ground from **four to six inches deep**, as early as possible in the Autumn, or where conditions permitted, in the Summer, the objective being to work the land down to a mellow tilth, so as to provide a fine level shallow bed, to obviate the possibility of the small seeds comprising the pasture mixture being buried too deeply.

Recent experiences have now shown that on many classes of soil, it is not only **unnecessary**, but harmful to **use a plough** when drilling the seed bed for sowing down Pasture Grasses and Clovers, and that "**surface cultivation**" is not only a **less costly** and effective operation, but in many instances **possesses distinct benefits** over the older method of ploughing deeply.

The reader is referred to the notes on "Surface Cultivation" for pasture establishment on pages 28, 29 for fuller information.

MIXTURE AND CLIMATIC CONDITIONS:—Owing to variations in soil and climatic conditions no one mixture can be adopted as a standard. The facts to be taken into consideration in determining the most suitable mixture are the climatic conditions of the district, whether the rainfall can be relied on or whether irrigation must be practised in dry weather, and the particular class of soil to be sown down. In many instances a few ounces of "Tarwei" Strawberry Clover per acre can be added with advantage. Strawberry Clover has particular soil requirements, and where these are suitable, there is no better permanent pasture plant. In many Grass and Clover paddocks grown under irrigation, there are depressions and swampy patches where the water may lodge for several days, and in such cases, while it is not always necessary to include "Tarwei" Strawberry Clover (which is a fairly costly seed) in the mixture, it is advisable to get a small quantity and to broadcast separately by hand in these moist patches.

GRASS AND CLOVER PASTURES (Continued).

FERTILISER:—Although natural manure is preferable to artificial or commercial fertilisers, the former is nowadays in such short supply that the latter must necessarily be relied on. While Superphosphate gives good results for later top-dressing, a little extra outlay on the initial application will prove a good investment, and the use of Bone Dust and Superphosphate mixed is to be preferred at this stage. About 112 lbs. per acre is a fair average on which to work, but the quantity varies with the class of land, and some country may require as much as 168 lbs. per acre. When using larger quantities of fertiliser, i.e., over 112 lbs. per acre, it will prove better to use only one half at time of sowing, and to apply the latter some eight or nine weeks later, when the grass and clover is showing strongly, and has made some headway.

The two principal methods of applying manure when sowing down may be summarised as follows:—

- (1) The fertiliser is applied to the ground and worked into the soil during the final operation of preparing the seed bed. This is the older system.
- (2) The Seed and Manure are mixed together and sown in one operation, either broadcasted or through the manure hose of the drill. This not only saves labor, but is more effective in operation than No. 1. Care must, however, be taken not to allow the manure and seed to stand mixed for any great length of time before sowing, otherwise the fertiliser is apt to burn the latter and impair the germination. From two to three hours is a safe margin, providing the manure is not allowed to become wet prior to seeding.



Pasture sown with FALSE PERENNIAL RYEGRASS on the same class of country and at the same time as that shown on page 13. Note the dominance of the Clovers and the low percentage of Ryegrass. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

Two other methods which have been tried out, and which have given satisfaction, are mentioned here as a matter of interest:—

- (3) To use no fertiliser at all when preparing the ground, or at time of actual sowing, but to withhold the application of manure until about three weeks after the seed has come through. This system may prove valuable with nitrogenous manures, such as Sulphate of Ammonia, even though it means an extra operation; but where Superphosphate and Bone Dust mixed, or Superphosphate alone are used, will not be found as effective as No. 2 method, quite apart from the saving in labor with the latter.
- (4) To Top-dress with manure as soon as the seed has been sown and harrowed, using a manure spreader. This method has been very satisfactorily and successfully carried out by Mr. Albert Clyne, of Newry, and his experience is that it is superior to all others.

The system is quite good, but really has no advantage over No. 2 method, and means an extra operation.

Referring again to method No. 3, it must be borne in mind that the operation is one requiring careful handling, and should it be desired to test it out against the other systems, it would be advisable to experiment first of all on a small area for the sake of experience. In the majority of cases, and especially where Superphosphate is the predominating fertiliser, the No. 2 method of sowing the seed and manure mixed together will be found the most effective.

GRASS AND CLOVER PASTURES (Continued).

WHEN TO SOW:—For districts where natural rainfall has to be relied on, the best time for sowing is with the first Autumn rains, although in some districts where a reasonably moist Spring and early Summer may be expected, the first half of August is not too late. These remarks also apply to districts where the pastures are to be grown under irrigation, but seeding as early as possible after the first Autumn rains is the ideal time, as it enables the Grasses and Clovers to establish themselves during the Winter and early Spring, and in dry districts, where irrigation must be practised, by the time it is necessary to water, the roots of the plants have obtained a firm hold in the soil. **Fairly thick seeding** is essential, especially **under irrigation**, and it is essential at all times that **only the best quality seed** be used, not only as regards **"Strain,"** but also in connection with **"Purity"** and **"Germination."** This sowing of Pasture Seeds of reliable strain, purity and germination is very important as regards the eventual results.



N.Z. "CERTIFIED" PERENNIAL RYEGRASS sown on high fertility land. Note the dense "bottom" produced and the freedom from weeds. Clovers and Trefoils have also been kept in their proper proportion. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

HOW TO SOW:—The seed may be either broadcasted or sown in rows. The most economical method, and one which provides for uniform distribution, is to sow through the grain run of a seed drill. For broadcasting use a Cahoon Hand Sower; while for drilling, any standard Seed Drill sowing in rows **seven (7) inches apart** will fill all requirements. If drilling, take the hoes out of the shoe and allow to hang loose. While sowing the seed, stir the mixture every couple of rounds to ensure an even distribution, and on completion, **roll the ground lightly** to compact the seed and soil. Finally, bear in mind that Grasses and Clovers are small seeds and **must not be buried**. Therefore, it is **essential that deep seeding be avoided**. When sowing under irrigation, give the land a good watering a few days before you are ready to proceed with seeding, and after allowing the water to soak in, sow the seed as soon as you can get on the ground thereafter. On no account irrigate after seeding, but wait until the seed is through and Grasses clearly showing, otherwise the seed is apt to be washed out and a patchy stand will be the result.

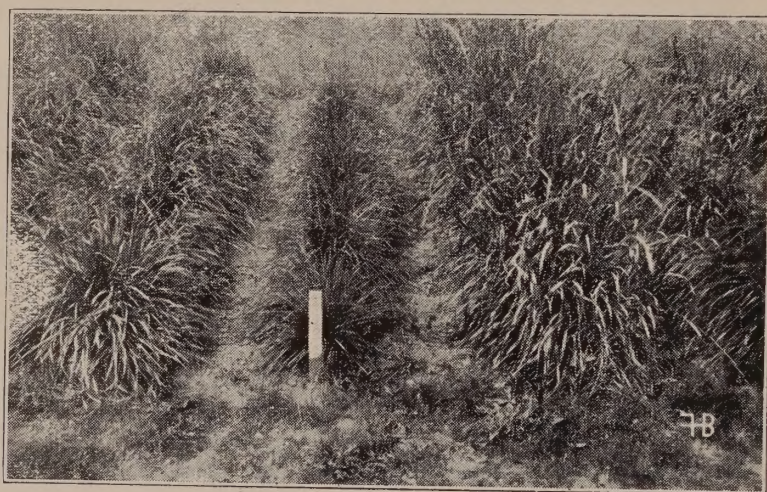
EARLY PRODUCTION OF THICK SWARD:—Having finally completed seeding, the **subsequent treatment** of the pasture must be such as to contribute to the earliest and most complete covering of the ground with a thick sward or mat of pasture, and in comparatively dry districts, such as Northern areas of Victoria, it is essential that this be accomplished before the first hot spell of Summer, both to **avoid surface caking of the soil** and to **check excessive evaporation**. These remarks, however, also apply to Gippsland and the Western District, where natural rainfall is relied on. As soon as the grass shows up a few inches, let a small number of sheep in on the paddock, but be especially careful never to overstock, only feeding off enough so that the **grass can keep a little ahead** of the stock. The effect of this treatment will soon be seen in the way in which the grass begins to stool, and soon the whole area will assume something of the appearance of a well-kept city lawn. The Clovers in the pasture are, as a rule, slower in the early stages of growth, and are not so manifest at first.

AVOID SEEDING IN EARLY STAGES:—Another point in the successful maintenance of these pastures is to **prevent seeding in the early stages**, although later on, the Ryegrass at any rate may be allowed to mature. To avoid continual grazing, which would be prejudicial to the pastures, the holding should be fenced off into small paddocks which can be grazed in rotation, thus preserving a continued succession of valuable feed and at the same time enabling those pastures already fed off to recover before again being grazed.

GRASS AND CLOVER PASTURES (Continued).

TOP-DRESSING:—Finally, to maintain the pastures in first-class condition and to improve the quality of the feed, **top-dress** the paddocks with **Superphosphate each year** as soon as conditions permit in the early Autumn, applying manure at the rate of **112 lbs. to the acre**. Grass and Clover pastures will stand more abuses than Lucerne, but they will not endure as much neglect, and to secure the best results the plants comprising same must be kept growing without check. Remember, however, that **top-dressing is only one step** in pasture improvement, and that to get the fullest value for the outlay on manure it is essential that the **other details of good management** also receive attention.

BRUNNING'S SERVICE:—A mixture carefully made up with due regard to the soil and climatic conditions is very essential, and for this reason we refrain from quoting any specific mixtures which may only mislead the reader, but will be only too pleased to give advice and **make recommendations without charge or obligation**, on receipt of details of soil, average rainfall, or if irrigation facilities are available and the purpose for which the mixture is required. In conclusion, let us once more emphasise **the necessity for using seeds of the highest purity**, i.e., thoroughly and efficiently machine-dressed to be free of weeds and foreign matter **as well as of the best strain**. The actual cost of the seed in comparison to the other expenses of laying down and maintaining a pasture is so small that a cutting down of a shilling or two per acre in the first place may easily mean a big loss eventually, having due regard to the other capital invested in the particular venture.



This photo, kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture, shows the "strain" differences in lines of Italian Ryegrass sold commercially. Left—typical New Zealand Italian type; middle—False Perennial sold as Italian; right—typical N.Z. Western Wolths type.

When Pastures are poor and thin, stock must travel over larger areas, tracks are worn and plants destroyed, while the animals lose their condition. Succulent pastures, regularly manured, produce contentment and the beasts fatten rapidly. Don't neglect top-dressing.

RYEGRASSES

(*Lolium* spp.)

The Ryegrasses most generally used by the farmer may be divided into five sections:—(1) **Perennial Ryegrass**, (2) **New Zealand South Island or False Perennial Ryegrass**, (3) **Italian Ryegrass**, (4) **Westernwolths Ryegrass**, (5) **Wimmera Ryegrass**.

Class (1):—The **truly Perennial Ryegrasses** embrace the Government certified strains as well as certain permanent and persistent stocks grown in Victoria and which, in the absence of a Government certification scheme, do not carry this desirable distinguishing characteristic. The Government certified strains of Perennial Ryegrass are dealt with fully in the Article on Certified Pasture Seeds (see Pages 33 and 36), and with certain exceptions (see below) where reliability and persistency of strain is required, Government certified seed should always be sown.

There are, however, many paddocks of Perennial Ryegrass of **truly permanent and persistent strain** in certain districts in **Victoria**, especially in and around Colac, Kyneton, Smeaton and Clunes, and some of this is quite equal in every respect to the **very finest type** of New Zealand certified seed. With the institution of an efficient and watertight certification scheme for Perennial Ryegrass in this State, it should be possible to purchase Victorian Ryegrass equal in strain to anything produced in New Zealand, but it must also be borne in mind that there are **many bushels of seed saved here each year** which, so far as "strain" is concerned, are **very little superior** to the ordinary New Zealand False Perennial Ryegrass.

RYEGRASSES (Continued).

When purchasing Victorian Ryegrass, however, owing to the absence of a **Government Certification Scheme in this State** it is necessary to rely solely on the reputation and integrity of the Seed Merchant. The Victorian **Department of Agriculture do carry out inspections** of Ryegrass fields and report as to the perenniality of the stand, but beyond this, **no further supervision**, either at time of harvesting or machine-dressing, nor in sealing or tagging of the sacks containing the seed, either in its rough or machine-dressed condition, **is undertaken** by their Officers. The Victorian Ryegrass seed saved by the **Clunes Ryegrass Growers' Association** from Government approved areas and **marketed for them by F. H. Brunning Pty. Ltd.** is one of the **most persistent and highly productive types of Victorian Ryegrass available**. This Clunes Ryegrass Growers' Association seed can be confidently recommended even though it may not be Government certified.



Hawkes Bay Ryegrass on Mr. L. V. Brown's property at Tallangatta. Seed sown in April and photograph taken in October. Wet weather prevented feeding off, and the paddock was cut for hay six months after seeding. By courtesy, Commonwealth Fertilisers and Chemicals Ltd.

Read carefully the article on Certified Pasture Seeds on pages 33 to 40. Hawkes Bay Ryegrass is discussed on page 36. "Strain," "Purity" and "Germination" are the Factors which constitute "Value" in Pasture Seeds.

Class (2):—This covers ordinary **New Zealand South Island** or **False Perennial Ryegrass**, most of which is really only suitable where temporary pasture is required, as most of the seed is only annual or biennial in duration, and trials have shown that a very large percentage of the **plants will die out** after the first Season. This **New Zealand South Island or False Perennial Ryegrass should not be sown** where "permanency" is the objective. The seed is usually otherwise of very good quality and after having been machine-dressed is generally of high purity and germination.

Class (3):—**Italian Ryegrass** is an annual, or at the best a biennial. The introduction of Italian Ryegrass under the New Zealand Government certification scheme (see Page..) will be interesting to readers, especially as the types vary to such an extent. With **New Zealand Government Certified "Mother" Italian Ryegrass** available, even though the price may be higher than that ruling for ordinary stock, farmers can purchase the seed with every confidence as to strain, or, in other words, being assured of buying the **most highly productive type**.

Class (4):—**Westernwolths Ryegrass** is an annual form very similar to Italian Ryegrass, but originally presumed to be a much heavier producing strain. With the introduction of Certified "Mother" Italian Ryegrass, the need for the use of Westernwolths type will disappear.

Class (5):—**Wimmera Ryegrass** is fully covered on Pages 46 and 47. This form of Ryegrass is variable and includes several types, so that it is necessary to **make certain** that any seed purchased is of a reliable highly productive strain. In this respect **Brunning's Contract Grown Wimmera Ryegrass** cannot be too highly recommended.

PERMANENT PASTURE MIXTURES

The Mixtures shown below are all based on previous experience of their success for the conditions recommended. While this list **will not cover all** requirements, these mixtures may be regarded as standards. If in doubt, write to **Brunnings**, Box 857.K., Melbourne, giving details of soil, rainfall, irrigation facilities, etc., and advice will gladly be given free of charge and without any obligation to purchase.

A number of mixtures listed in former publications have **now** been **dis-**
carded, hence the break in numerical order.

Mixture No. 2003.

- 25 lbs. Perennial Ryegrass
- 2 lbs. Alsike Clover
- 2 lbs. White Clover
- 2 lbs. Cow Grass
- 9 lbs. Italian Ryegrass
- (40 lbs. of seed per acre.)

Mixture No. 2004.

- 25 lbs. Perennial Ryegrass
- 10 lbs. Cocksfoot
- 2 lbs. White Clover
- 2 lbs. Cow Grass
- 1 lb. Alsike Clover
- (40 lbs. of seed per acre.)

Mixture No. 2010.

- 15 lbs. Perennial Ryegrass
- 5 lbs. Cocksfoot
- 1 lb. White Clover
- 2 lbs. Alsike Clover
- 2 lbs. Sweet Clover
- 2 lbs. Crested Dogstail
- 2 lbs. Timothy
- 1 lb. Giant Colonial Cowgrass
- (30 lbs. of seed per acre.)

THE "A1" MIXTURE No. 2000. (Special Govt. "Certified" Seeds only.)

- 20 lbs. Hawkes Bay "Mother" Ryegrass
- 5 lbs. N.Z. Akaroa "Mother" Cocksfoot
- 2 lbs. N.Z. White Clover, "Mother" Seed.
- (27 lbs. of seed per acre.)

The "Ideal" Mixture for first class land and thoroughly per-
manent. High class country requires the highest grade mixture
for the greatest returns.

Mixture No. 2012.

- 20 lbs. Old Pasture Ryegrass
- 3 lbs. Creeping Bent
- 1 lb. Alsike Clover
- 1 lb. "TARWEI" Strawberry Clover
- (25 lbs. of seed per acre.)

Mixture No. 2017.

- 20 lbs. Perennial Ryegrass
- 7 lbs. Cocksfoot
- 2 lbs. Kentucky Bluegrass
- 2 lbs. Chewing's Fescue
- 2 lbs. Cow Grass
- 2 lbs. Sweet Clover
- 1 lb. Subterranean Clover
- (36 lbs. of seed per acre.)

Mixture No. 2018.

- 20 lbs. Perennial Ryegrass
- 7 lbs. Cocksfoot
- 1 lb. Crested Dogstail
- 1 lb. White Clover
- 1 lb. Cow Grass
- 1 lb. Alsike Clover
- 1 lb. Subterranean Clover
- (32 lbs. of seed per acre.)

Mixture No. 2020.

- 20 lbs. Perennial Ryegrass
- 10 lbs. Italian Ryegrass
- 5 lbs. Cocksfoot
- 2 lbs. White Clover
- 1½ lbs. Sweet Clover
- 1½ lbs. Cow Grass
- 1 lb. Subterranean Clover
- (41 lbs. of seed per acre.)

Mixture No. 2021.

- 12 lbs. Wimmera Ryegrass
- 1 lb. Kentucky Bluegrass
- 2½ lbs. Sweet Clover
- ½ lb. Subterranean Clover
- (16 lbs. of seed per acre.)

Mixture No. 2022.

- 10 lbs. Paspalum Dilatatum
- 1 lb. "TARWEI" Strawberry Clover
- 1 lb. White Clover
- 15 lbs. Perennial Ryegrass
- (27 lbs. of seed per acre.)

Mixture No. 2025.

- 15 lbs. Perennial Ryegrass
- 6 lbs. Cocksfoot
- 6 lbs. Paspalum Dilatatum
- 3 lbs. Cow Grass
- 2 lbs. White Clover
- 2 lbs. Subterranean Clover
- (34 lbs. of seed per acre.)

Mixture No. 2026 (Recommended by the Water Supply Commission).

- 10 lbs. Perennial Ryegrass
- 3 lbs. Cocksfoot
- 1 lb. White Clover
- 1 lb. Alsike Clover
- 3 lbs. Italian Ryegrass
- 2 lbs. Cow Grass
- 1 lb. Subterranean Clover
- ½ lb. Strawberry Clover
- (21½ lbs. of seed per acre.)

Mixture No. 2027.

- 10 lbs. Sth. Island N.Z. Ryegrass
- 10 lbs. Italian Ryegrass
- 4 lbs. Brown Top
- 1 lb. Wallaby Grass, Pilosa
- 1 lb. White Clover
- (26 lbs. of seed per acre.)

Mixture No. 2028.

- 20 lbs. Perennial Ryegrass
- 3 lbs. Timothy
- 2 lbs. Cow Grass
- 1 lb. White Clover
- 1 lb. Alsike Clover
- (27 lbs. of seed per acre.)

Mixture No. 2029.

- 2½ lbs. Phalaris Tuberosa
- 1 lb. Alsike Clover
- 2 lbs. H. River Lucerne
- ½ lb. White Clover
- (6 lbs. of seed per acre.)

PERMANENT PASTURE MIXTURES (Continued).

Conditions for Using Brunning's Mixtures.

Mixture No. 2003 is a good general purpose sowing for irrigated districts in Northern Victoria, while **No. 2004** is recommended for localities with a good natural rainfall, such as Gippsland. **No. 2004** is a first class sowing on good class land, river flat country, etc.

The "**A.1**" **Mixture No. 2000** consists of Govt. "**Certified**" seeds only, and is the **ideal for first class land**, especially where there is a good natural rainfall. It is recommended where a truly permanent pasture of a highly productive nature is desired. **Mixture 2010** is one that has proved highly successful in the Goulburn Valley and elsewhere in Victoria, under irrigation; while **Nos. 2012** and **2022** are for pasture purposes on moist and swampy country. **No. 2012** is the better for wet or acid soils, heavy black loamy ground and peaty swamps, and **No. 2022** is better adapted to light soil and temperate to warm conditions.



Inspecting Permanent Pastures on the property of Mr. J. T. Bullingham, Tongala. These pastures have all been heavily manured. By courtesy of Commonwealth Fertilisers and Chemicals Ltd.

Modern Grass philosophy can be summed up in four words—**Species, Strain, Fertility and Management.** It is along these lines that Mr. W. Davies, the well known agrostologist, considers grassland experiments must be conducted.

No. 2017 is for good quality land in rather dry situations and in mild to medium climates where irrigation is not available and rainfall comparatively light. **No. 2018** is suitable for Gippsland and similar climates on medium to good, but not first class soil.

No. 2020 is designed for medium quality land and for a thick cover, the Italian Ryegrass having been included for that purpose; while **No. 2021** is for dry districts with a very limited rainfall such as the Mallee and North-Western Victoria. **No. 2022** has been dealt with above.

No. 2025 is suitable for second class and third class country only and is well adapted to many parts of Gippsland, but should on no account be sown in first class river flat land or under irrigation. **No. 2026** is one recommended by the State Rivers and Water Supply Commission for assuring good pastures, but **in our opinion**, the balance between the grasses and clovers requires adjusting and **more grass seed per acre** should be included in this mixture, **No. 2026.**

No. 2027 is a mixture for second and third class country and will do well on hill land. It is **not recommended** for growing under irrigation.

No. 2028 is a mixture for good class country with reasonable rainfall and will also do well under irrigation. **No. 2029** is an excellent basis for establishing *Phalaris Tuberosa*, which in the course of two or three years, will displace the other ingredients in the mixture.

For further information about these or other Permanent Pasture Mixtures, please write to **Brunnings, Box 857.K., Melbourne.**

AGROSTIS OR BENT GRASSES

In the formation of close-textured, true surfaced turf such as is required for bowling greens, croquet lawns, putting greens, etc., the Bent Grasses are well-known, highly esteemed and largely used in Australia.

The value of some of the species from a Pasture point of view is perhaps not so fully recognised, and for that reason and to classify the principal into easily understandable form for general commercial (not necessarily for highly technical botanical) purposes, this article on the Agrostis has been included.

The Agrostis or Bent Grasses in commercial use may be classified into three types, viz:—

- (a) Spreading by means of underground stems or rhizomes.
- (b) Upright growing or spreading by means of short underground stems.
- (c) Surface creeping propagating themselves by stolons.

The actual species in general use comprise:—

1. Agrostis Alba, commonly known as Red Top or Herds Grass.
2. Agrostis Tenuis var. Aristata or Dry Land Brown Top.
3. Agrostis Tenuis, better known as Brown Top.
4. Agrostis Palustris, which includes Seaside Bent, Cocoos Bent, etc.
5. Agrostis Canina or Velvet Bent.

Of these, *Agrostis Alba*, or Red Top, and *Agrostis Tenuis*, or Brown Top, are the only two at present used to any extent in agriculture, although the Dry Land Brown Top may also prove very valuable for this purpose when better known.



SINGLE PLANT OF AMERICAN RED TOP (*A. Alba*), showing the coarse nature of the plant, with tendency to spread and form a loose open sward incompatible with the making of a good lawn or close textured turf. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

Type (a) comprises *A. Alba* and *A. Tenuis*, var. *Aristata*, both of these species spreading by means of long underground stems. Apart from this, they differ very materially as the former (Red Top) is a comparatively coarse growing type.

Red Top is suitable for inclusion in pastures sown down on moist country and grows well in association with Ryegrass and "Tarwei" Strawberry Clover. It is not fine enough in texture for putting greens or fine class turf, although it is often used on golf course fairways with satisfactory results.

A. Tenuis var. *Aristata*, or **Dry Land Brown Top**, was introduced by Mr. E. Bruce Levy, the well-known New Zealand pasture authority. The botanical and the common names are rather misleading, as it is quite distinct from the ordinary *A. Tenuis* or Brown Top, and is said to very closely resemble the grass grown in America under the names of Oregon and Highland Bent.

Dry Land Brown Top is fine enough for making good close textured turf, and will, no doubt, be largely used for this purpose in dry positions where regular watering is difficult. The leaf is finer than the ordinary Brown Top, and of a greyish green color, while the root stock has strong underground creeping stems.

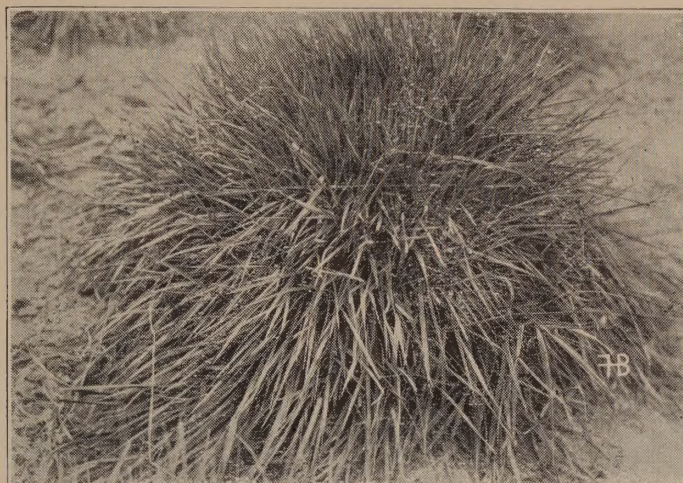
So far, the Dry Land Brown Top has not been tried for pasture purposes in Australia, and no data regarding its suitability in this respect is available.

Type (b) includes *Agrostis Tenuis*, or Browntop. This is an upright growing type which spreads by means of short underground stems. Either alone or in mixture with Cheving's Fescue, Brown Top makes one of the finest putting surfaces available, and is particularly valuable in this respect for special purposes—lawns, bowling greens, etc. Brown Top has been very little used in agriculture in Australia, but is an excellent grass for second and third class land, and should be more widely used as an ingredient for pasture mixtures for this class of country. See illustrations on pages 17 and 39.

It is not suitable for sowing for pasture purposes on first class country.

AGROSTIS OR BENT GRASSES (Continued).

Type (c) comprises the *Agrostis Palustris* species, including Seaside Bent, Cocoos Bent, etc., as well as *Agrostis Canina* or Velvet Bent, which is one of the finest textured types of this family. Seed of *Agrostis Canina* is **not at present available** in commerce in Australia.



SINGLE PLANT OF DRYLAND BROWN-TOP

(Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.)

Agrostis Palustris is a creeping type which spreads by means of over-ground stolons or runners, but requires ample moisture and frequent applications of compost for the best results. It is extremely valuable for putting greens, and this class of lawn work, but requires more intense management than the other species, although it responds to such treatment. It is **not generally used** in agriculture.



Single Plant of AGROSTIS PALUSTRIS (Cocoos or Seaside Bent). This is the true Creeping Bent which spreads by surface creeping stolons as dealt with under type (c) on this page.

SOIL ANALYSIS

We desire to make it clear that **we do not and cannot undertake the analysis of soil.** For the convenience of clients, we have ascertained that a chemical analysis of Victorian soils will be made by the Agricultural Chemist, Department of Agriculture, Public Offices, Melbourne, on payment of a **fee of 10/6 per sample** in ordinary cases. Where the analysis is required urgently, a higher fee is charged, and where the sub-soil is also forwarded, it is considered as a separate sample.

In **forwarding the samples, state** (1) the depth of the samples taken; (2) where the land is situated; (3) whether the soil is from level country, swamp, alluvial land, or from hill country—if from hill country the aspect should be stated; (4) if it is virgin soil, whether it is forest or open country—if forest, the kind of trees and undergrowth should be mentioned—if open country, the kind of grasses growing on it, and their feeding value; (5) if it is in cultivation, how long it has been cultivated, what was the last crop, when and what was its last manuring, what has been the yield per acre, and what is considered a good yield in the district; (6) whether the land is drained or not; (7) what is the nature of the climate and seasons of the district, and what kind of weather prevailed for the few days previous to taking the sample; (8) what lies below the subsoil.

Further particulars can be obtained from the Agricultural Chemist, Agricultural Laboratory, Public Offices, Melbourne.

COCKSFOOT

(*Dactylis glomerata*)

The special merits of Cocksfoot as a valuable high production permanent pasture grass are too well-known to need any explanation. The purpose of this Article is to explain the principal types of Cocksfoot in commerce here. They are as follows:—

1. New Zealand Government Certified Cocksfoot of the Akaroa type.
2. New Zealand Akaroa Grown Cocksfoot (Uncertified).
3. New Zealand Plains Grown Cocksfoot (Uncertified).
4. Danish Cocksfoot.
5. Victorian Cocksfoot.

Classes 1, 2 and 3:—The Article on New Zealand Cocksfoot under the heading of "Certified Pasture Seeds" (see page 36) covers all the explanation necessary regarding the first three classes. Certainly the **most desirable type** is the New Zealand Government **Certified strain**, and next to this. Uncertified Akaroa or New Zealand Plains Grown Cocksfoot should be used. This matter is also dealt with under the heading of "Best Strains" on Page

Class 4:—Danish Cocksfoot is a "**stemmy**" species and a very **heavy seed producer**, but is **not so persistent** as the more reliable New Zealand grown types as **stemminess rather than leafiness** is the predominant characteristic, and is of much **lower feeding value**.



New Zealand "Certified" Cocksfoot (rows left and right) compared with Danish Cocksfoot (middle row). Note the high leafy nature of the New Zealand strain compared with the scanty leaf and high proportion of seed stalk produced by the Danish type. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

The **inferiority of the Danish type** of Cocksfoot has now been recognised by the Commonwealth Government, which, acting under a recommendation from the C.S.I. & R., recently introduced a regulation prescribing that, from the 18th September, 1934, all **Cocksfoot seed** imported into the Commonwealth **must be stained with rouge**, unless it is shown to be a highly persistent strain grown under Government supervision, which really means that unless the Cocksfoot Seed is that of the **very highest perennial strain** and the finest type **No. 1** as regards **leafiness**, it **must be colored** to render it readily distinguishable from the more desirable productive type, before admission into Australia is permitted. The **future value** of this Regulation will be that any farmer buying unstained, imported Cocksfoot, can (**after current stocks** of Danish and other low grade types have been disposed of) rely on such seed being of the high productive, truly perennial, leafy, Akaroa strain.

Class 5:—As with Victorian Ryegrass, a very large percentage of Victorian grown Cocksfoot is of a very fine strain, and reliable Genuine Victorian Grown Cocksfoot is, in many instances, quite equal in strain and other desirable attributes, to New Zealand Government Certified seed for permanent pasture purposes.

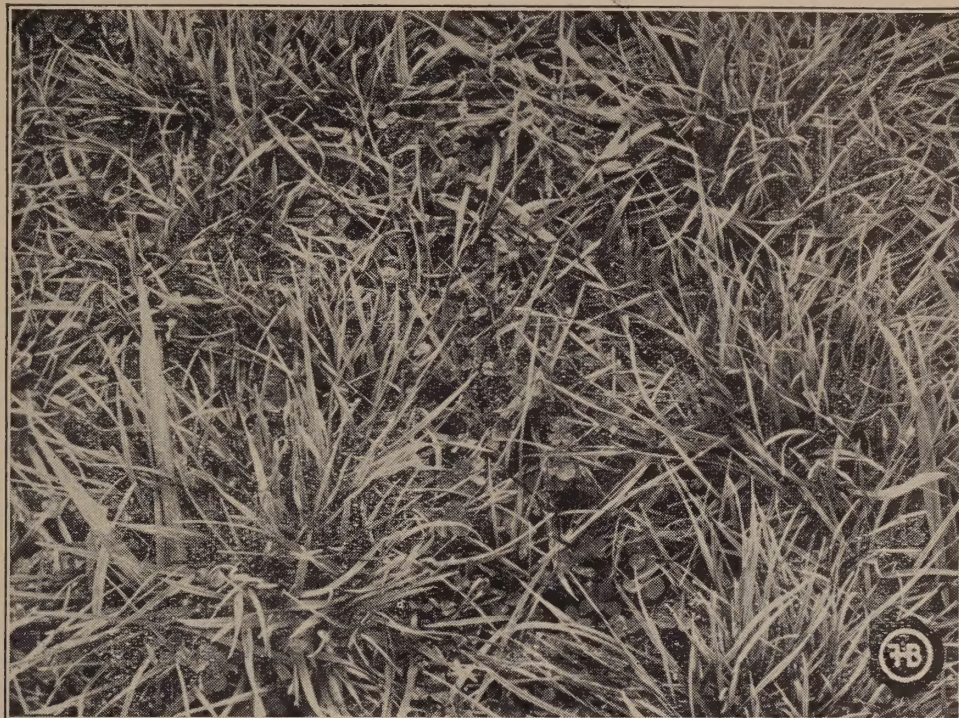
The **quantity of Victorian Cocksfoot seed** of good strain at present **harvested is too small** to be of any appreciable value for commercial purposes, and **for that reason** the New Zealand Government Certified "Mother" Akaroa strain of Cocksfoot is recommended where the most persistent reliable strain of this splendid permanent pasture plant is required.

COCKSFOOT (Continued).

GENERAL:—The preceding remarks on Cocksfoot have been written wholly in connection with **"Strain" values**, i.e., persistency, productiveness and high percentage of leafiness, as opposed to stem (or, in other words, the type giving the greatest amount of nutritious and palatable fodder), rather than in respect of **analysis** (purity and germination).

Indeed in the matter of purity and germination, Cocksfoot differs from most other pasture seeds, insomuch as the **highest in strain purity**, i.e., Government Certified "Mother" Akaroa, is generally the poorest in purity and germination; while conversely the **inferior low-grade type**, Danish Cocksfoot, is usually sold on the specifications of purity 90 per cent., germination 95 per cent., these figures being based on the Continental or Swiss system of seed testing.

This comparison may, at first view, appear rather alarming, but although the percentage of purity on Certified "Mother" Akaroa Cocksfoot is generally fairly low, the **high impurity content is almost entirely due to inert matter** (empty husks, straws, etc.) and **not to excess** percentage of foreign or noxious weed seeds.



A close up view of Crested Dogtail Sward.

Wimmera Ryegrass and Extra Early Dwalganup Subterranean Clover make a splendid Winter and Spring Permanent Pasture association for districts with a very low average annual rainfall. See pages 64 and 66 for fuller information.

CRESTED DOGSTAIL

(*Cynosurus Cristata*)

Crested Dogtail is a perennial tufted grass growing from 20 to 24 inches high. It does well either sown alone or in association with other Grasses and Clovers, being very suitable for inclusion in mixtures as a "bottom" grass.

It is not recommended for first class land, but does well on heavy moist ground as well as on hilly country in comparatively dry situations. The roots penetrate deeply into the soil and when once established, this grass is thus enabled to withstand dry weather well.

Sown alone, **20 lbs. of seed** is required for an acre, but Crested Dogtail is more generally used in association with other Grasses and Clovers when from **2 lbs. to 5 lbs. per acre** is included, the quantity depending on the composition of the mixture. These figures refer to the use of **Brunning's Supergrade M/D Seed**.

PASPALUM DILATATUM

(Golden Crown Grass)

Paspalum Dilatatum or Golden Crown Grass is a native of South America introduced into Northern New South Wales many years ago. It is a perennial of strong, deep-rooting habit, which enables it to become thoroughly established, and on moist ground, under favorable climatic conditions, it is rather hard to eradicate. It is of bunchy or tussocky growth, with leaves numerous near the ground, but very few on the stems, and while it has a tendency to spread to land where it is not wanted, this can be overcome by laying down a limited area only and keeping it in check by sowing the nearby portions of the holding with other fodder crops which require constant cultivation. Another disadvantage is its excessive root development, which in time mats the ground to such an extent that the grass is eventually choked and dies off, but this, however, **may be easily controlled** by ploughing and cultivating.

CLIMATIC ADAPTABILITY:—Where soil conditions are reasonably suitable, Paspalum Dilatatum can be successfully grown in all the States of Australia, with the exception of Tasmania. In the colder localities the season of growth is much shorter, but in districts with a comparatively mild Winter, once established, Paspalum Dilatatum will hold in the ground and start into growth again with the first evidence of warm weather.



The "Sunpalm" Pasture Renovator at work on Mr. J. Bancroft's farm at Lawrence, North Coast, N.S.W. This photo. clearly shows the decisive nature of the renovation effected. The sourced and choked paspalum pastures are given fresh life.

Before buying Pasture or other Farm Seeds, read carefully the article on "Value" on page 51.

UTILITY:—Paspalum Dilatatum may be used both for pasture and as a hay grass. It is suitable for grazing dairy cattle, yields a large quantity of herbage palatable to all kinds of stock, and under reasonably congenial weather provides pasture for a considerable period of the year, the dormant period being during the Winter. Being soft and succulent and not wiry like many other grasses, **cattle will eat almost every part of the plant**, and this is a desirable quality, as when grown for permanent pasture it **must be kept well eaten down** to preserve its succulency and tenderness, as well as to prevent it from growing into objectionable tussocks. Paspalum Dilatatum may also be **cut for hay**, which, especially when the plant is grown in mixture with one of the Clovers to make the right balance, is of very excellent quality.

QUALITY OF SEED:—Although produced very abundantly, seed of Paspalum Dilatatum **ripens unevenly** and shatters easily. For the finest quality with the least proportion of immature or unripe seed (i.e., the highest percentage of germination), it is **necessary to hand-strip or hand-shake** from the plants. Seed which is saved in any other manner is usually of very low purity and growth. It is of course necessary to machine-dress after harvesting, to remove straws, dirt, light grains, inert matter, etc., and thus bring the seed up to the highest degree of purity and germination. Care must therefore be taken to **buy only HAND-SHAKEN** seed, and in this, as well as in every other desirable attribute, **Brunning's Supergrade Paspalum Dilatatum** can be thoroughly relied on.

Even a well machine-dressed line of hand-shaken seed does not possess very high viability, and Paspalum Dilatatum, showing under test by the **Irish or Belfast system** a growth of **40 per cent.** or over, may be considered good. **The Continental or Swiss system** of seed testing is very misleading when applied to seeds such as Paspalum Dilatatum and the results from such tests should be disregarded.

PASPALUM DILATATUM (Continued).

SOIL REQUIREMENTS AND PREPARATION:—Paspalum Dilatatum revels in a deep, rich soil, and moisture is essential to success. It will grow splendidly in damp localities and on swampy or marshy land liable to dry up and crack in the Summer, as owing to its deep-rooting habit, the roots penetrate well down into the ground and are thus able to withstand dry, hot Summers as well as a fairly long drought. Where conditions permit, the plant well repays a properly prepared seed bed, but usually the seed is sown broadcast on the ashes after a burn, although providing the weather is mild at time of seeding. Paspalum will soon establish itself from seed with very little preparation of the ground.

Do not sow Paspalum Dilatatum on land intended to be irrigated either by itself or in mixture with other Grasses and Clovers. Apart from the possibility of the seed being distributed by stock **there is always** a very great **danger** of the irrigation waters carrying it to places where it is not required or to first-class land, and in this way it is liable to become a pest.



Showing the thick growth and heavy feeding properties of Paspalum Dilatatum. Photo. kindly supplied by Queensland Agricultural Department.

METHOD AND TIME OF SOWING:—Seeding can be carried out from the first rains in March to the end of April, and again from the end of August to the middle of October in districts with a comparatively mild Winter, but in localities where the cold weather sets in early and the Winters are more severe it would be advisable not to sow after the first week in April or before the middle of September. Sowing too late in the Autumn or too early in the Spring is not advisable, as if the soil is cold the seed is liable to hang in the ground and may possibly rot. Spring seeding generally gives the best results as the ground being warm, the germination is speedy and the plants soon grow and establish themselves. As the seed of Paspalum Dilatatum is very light and somewhat difficult to distribute, sowing through a drill is hardly feasible, and the general and most convenient method is to broadcast, mixing the seed with dry sand to ensure an even distribution, and using from 7 to 8 lbs. of Brunning's Supergrade Hand-shaken re-cleaned seed per acre.

SUBSEQUENT TREATMENT:—When the plants are from 10 to 12 inches high, stock can be turned in for a few days at the rate of 3 or 4 beasts to the acre, so as to keep down the weeds until the Paspalum gets a good start. Do not allow the stock to remain too long on the pasture, otherwise the young plants are liable to be eaten down before thoroughly establishing themselves. The paddock can then be given a rest, and in a few weeks will be growing strongly; by this time the roots will have thoroughly established themselves, when the pasture can be grazed continuously. Owing to the excessive root development, which mats to such an extent that it will choke the plants, it is quite possible that after several years the pasture will go off and will not respond satisfactorily to a top-dressing with fertiliser. At this stage it will require renewing, and the best method is to plough and sow the ground down in Perennial Ryegrass, Cocksfoot and Mixed Clovers, or some other grass mixture suited to the soil and climatic conditions prevailing.

This mixture will give good results for a certain period, and until the Paspalum again takes possession, or the old Paspalum sod may be broken up by double disc ploughing twice, three inches deep the first time and deeper the second, following this by harrowing and cross harrowing. By this means the roots are sufficiently broken to rejuvenate the pasture, after which top-dress with Superphosphate, and then sow some White Dutch or "Tarwei" Strawberry Clover, using the latter for very damp localities. **Paspalum pastures give the best results** when they can be heavily stocked to prevent rank growth, and close pasturing allows for a better development of the plant, together with a greater stooling out of any Clovers when sown in mixture.

In the Northern Rivers district of New South Wales, the highest milk yields are secured by those farmers who keep their Paspalum pastured like a turf.

In a moist season, it often happens that Paspalum will grow quicker than the stock can keep it eaten down, and in this case the excess growth can be well utilised for hay. **The best time to cut** is just before the flowers appear, and by this means the woody, fibrous nature of mature Paspalum hay is eliminated. The hay can be readily cured, and when Paspalum is grown in mixture with either White Clover or "Tarwei" Strawberry Clover the result is a mixed hay of excellent quality, very palatable to stock.

MIXTURES:—Paspalum does well sown in mixture with Ryegrass, Cocksfoot and Clovers, and under such conditions is usually sown at the rate of 2 lbs. to the acre, the quantity varying according to the ingredients.

Paspalum Dilatatum also grows exceptionally well in association with White Dutch Clover and also with "Tarwei" Strawberry Clover, making an excellently balanced ration.

PRAIRIE GRASS

A Wonderful Winter Permanent Pasture.

Lucerne is too well known as one of the leading fodder plants of Australia to need any further description, but its period of usefulness (except in the case of stored hay) is limited to the late Spring, Summer and Autumn, and in no respect is it an "all-the-year-round" fodder. In this connection the deficiency may be filled by using a possibly **less well known, although equally valuable and high grade fodder** in Prairie Grass, which, with **less attention than is required** to grow Lucerne successfully, will do through the cooler period of the year all that Lucerne will do in the late Spring, Summer, and early Autumn, and a reasonably fair trial is all that is necessary to prove that this permanent pasture is, during its period of production, of equally as high value as Lucerne. Under average conditions, and with proper treatment of the pasture, an average of over a cow to the acre may be milked on Prairie Grass right through the Winter.

UTILITY:—Prairie Grass may be grazed, cut for green feed or saved for a hay crop, and all these are of the highest feeding value, while the herbage is perhaps the **most palatable fodder known**. So highly palatable is Prairie Grass that it is **inadvisable to sow the plant in mixture** with other Grasses and Clovers as stock will eat out the Prairie and neglect the other ingredients in the pasture. The plant will give excellent results in Gippsland, the Western District of Victoria and other localities with a similar rainfall, as well as in Northern Victoria, where ample facilities for irrigation are available. Prairie Grass is not a drought-resistant fodder in dry, hot districts.

SOIL:—Prairie Grass does well in most good soils, but it gives the **best results in moist or slightly damp ground**. Being a gross feeder, **fairly rich land is essential**. A properly prepared seed bed is well repaid and is worth while considering the permanency of the plant with proper treatment.

SEED SOWING:—The best time for sowing Prairie Grass seed is in the **Autumn or early Winter**, although seeding may be made as late as September in districts where there is a good rainfall or where irrigation is available. The seed is generally sown broadcast, using a Cahoon sower, under which conditions from **30 to 40 lbs. of high-class seed of strong growth** is required to sow an acre. After seeding, it is advisable to **harrow and roll**.

SUBSEQUENT TREATMENT:—As soon as the grass shows up about four or five inches, let a few sheep run in the paddock, **being careful not to over-stock**, but just feeding off enough to let the grass keep ahead of the stock. This will cause the plants to stool out, after which, the crop may be allowed to attain greater growth, when it may be more heavily pastured with horses or cattle, if required, or allowed to run up for a hay crop. **Prairie Grass does not stand heavy continuous grazing**, and for that reason is best grown in small paddocks to permit of spelling regularly, otherwise it is liable to be eaten out. **Small paddocks**, not allowing stock to pasture too heavily or too long on any one block, **reasonable spelling** between grazings and **top-dressing will maintain an established Prairie Grass pasture** in high state of productivity for many years. After the Spring flush of herbage comes, grazing may be discontinued and the paddocks shut up to yield a crop of hay heavier than Oats would average, and a hay which is **more palatable to stock than either that from Wheat or Oats** and quite equal in every way to Lucerne hay. By feeding this hay to the stock, Prairie Grass may be established through the animals on any suitable spots on the property, especially on tussocky flats, where the Prairie can find effectual shelter and spread.

One great essential to preserving the permanency of Prairie Grass is protection of the exposed crown of the plant during dry, hot weather, and for this reason, grazing must be discontinued during the late Spring, Summer and early Autumn. Indeed, even in Winter, it will be found more profitable to cut and feed this grass.

FERTILISER:—Prairie Grass is a gross feeder and well repays manuring. A top-dressing in the early Autumn each year will be found profitable. Where available, farmyard or sheepyard manure is recommended, but when not obtainable, a dressing of **140 lbs. per acre of Superphosphate and Bone Dust mixed** will prove a good substitute.

SEED:—As with other pastures laid down for a number of years, the use of the highest quality, plump-bodied, strong germinating seed free from smut is essential, and in this respect, **Brunning's Supergrade Machine-dressed Prairie Grass**, together with attention to the preceding directions, can always be relied on to ensure satisfactory results.

PHALARIS TUBEROSA

(Toowoomba Canary Grass)

Nearly twenty-five years ago, the special Winter growing features, heavy productiveness and high feeding value of *Phalaris Tuberosa* were first recognised. This plant was originally introduced under the **erroneous name of *Phalaris Commutata***, and in those days was commonly called Toowoomba Canary Grass. Several years later when its many valuable features were becoming fully realised, the plant was then more correctly identified and became fairly well known under the name of ***Phalaris Bulbosa***, until about six years ago, when, after reference to the leading overseas authorities, the name of the **true perennial type of *Phalaris***, the species dealt with in this article, was definitely fixed as ***Tuberosa***.

UTILITY:—The principal usefulness of *P. Tuberosa* is as a Winter and Spring fodder, its productiveness being practically nil from late Spring until mid-Autumn. The plant thrives under low temperatures and is especially valuable on account of the way in which it **withstands hard, cold conditions**, although, generally speaking, its climatic adaptability to both cold and warm conditions is rather amazing. *P. Tuberosa* has been known to **grow an inch or more a day in the depth of Winter**.

This species is one of our best high production permanent pastures for Winter and Spring grazing, is useful for cutting for green feed, and will produce a valuable hay crop. Another feature not generally recognised is its **value as a honey plant for bees** during the late Spring period (middle of October to end of November), and in this connection, *P. Tuberosa* should be equally of interest both to apiarists and to those graziers who, while able to utilise it for pasture purposes also, engage in bee farming as a side-line.



Phalaris Tuberosa pasture on the property of Mr. L. Young at "Eulong," Cavendish.
By courtesy of Commonwealth Fertilisers and Chemicals Ltd.

See the blue pages 33 to 40 for full particulars of Certified Pasture Seeds. "Strain" is what counts when laying down a Permanent Pasture.

VARIETIES:—The *Phalaris* family includes a large number of species, and apart from *P. Tuberosa*, the principal varieties in commerce are:—

P. Arundinacea (Reed's Canary Grass), which is a very useful perennial for marshes, swampy, boggy ground and similar classes of country.

P. Canariensis (Canary Grass), which produces the Canary seed of commerce. This species is an annual and of no value for pasture purposes, its usefulness being confined to its production of seed for feeding birds, and in this connection it is a very heavy yielder.

Another variety which is really a weed of no economic value, is ***P. Minor***; the seed is not available in the ordinary way of commerce and reference to this inferior annual species is made, because **seed of *P. Minor* has been sold** at times in error as the true perennial type of *Tuberosa*. Care must be exercised when purchasing seed of *P. Tuberosa* to be certain of getting the true perennial type, especially as it is almost impossible, except for an expert (and not always then) to accurately distinguish, from an ordinary inspection, between seed of the two species.

The **only sure method** is to purchase **Brunning's** true strain of N.S.W. Government Certified "**Mother**" *Phalaris Tuberosa*. This is the purest type available. Certification of *P. Tuberosa* is very essential owing to the readiness with which the members of this family cross-fertilise, but **Brunning's** N.S.W. Government Certified "**Mother**" *Phalaris Tuberosa* seed can be relied on to be the right type, almost entirely free of foreign species and annuals and of a reasonable percentage of growth. See also page 39.

PHALARIS TUBEROSA (Continued).

SEED:—Even for the expert, it is difficult to distinguish between seed of the true *P. Tuberosa* and that of *P. Minor*, so that it is essential for the farmer to purchase supplies from a reputable Seed House. The following points are, however, of value in making distinction between the highly valuable *P. Tuberosa* and the inferior, worthless *P. Minor*.

Under a Quartz lamp (the Ultra-Violet Ray system), seed of the **true type** of *P. Tuberosa* germinated on blotting paper **will show the roots** clearly defined, while in the case of *P. Minor* the **rootlets are not at all visible**. Another reliable guide is that on the germinating tray *P. Tuberosa* shows a **white tip** to the rootlets, while *P. Minor* definitely shows a **pink tip**.

Even in seed of the very highest quality strain there may be 1 per cent. or so of strangers or plants showing slight variations from the true type. The characteristics of these strangers should be carefully noted and the field rogued (untrue type plants taken out) as soon as it has been determined which is the true *Tuberosa* and which are the foreigners. The safest method at all times is firstly to **buy from a reputable Seed House**, such as **Brunnings**, and secondly to **purchase nothing but Genuine Government Certified seed**.

CLIMATIC ADAPTION:—The plant can be cultivated under a very wide range of climatic conditions in Australia. When originally introduced, nearly twenty-five years ago, it was most successfully grown in Southern Queensland, where it became commonly known as Toowoomba Canary Grass. At Guyra, on the New England Table-lands of New South Wales, its value has been recognised for many years, and many hundreds of acres are laid down there with an association of *Phalaris Tuberosa* and White Clover, which has rendered the paddocks in question equally as good for fattening stock during the Winter as in the Spring or Summer, or, in other words, providing a definite and actual "all-the-year-round" pasture.

In the better rainfall areas of the South-Eastern Riverina, providing *P. Tuberosa* is grazed systematically and kept within reasonable bounds, it is a highly succulent, palatable and nutritious fodder.



Phalaris Tuberosa pasture at Carrum. By courtesy, Commonwealth Fertilisers and Chemicals Ltd.

At Holbrook, in New South Wales, a 30-acre paddock in the third season carried **a beast to the acre** in good fat condition **from April to October**, while cattle on adjoining country only just held their own during the Winter on a basis of one beast to five acres. What better testimony could be had as to its high productiveness.

At Tintaldra, on the Upper Murray, a district famed for the excellent fattening qualities of its pastures, and a locality which is one of the best dairying districts in Victoria, *Phalaris* was successfully introduced in a **mixture made up of 1 lb. of *P. Tuberosa*, 2 lbs. of Lucerne and 1 lb. of Alsike Clover per acre**. The value of this association has been more than proved during the past four years.

A further proof of the climatic adaptability of the plant is shown by the excellent pastures, still in highly productive condition, established many years ago in several parts of Gippsland. The plant has more than proved its valuable utility in South Australia and Western Australia. The successful trials made by the Waite Research Institute, Adelaide, some years ago, has been amply confirmed by areas since sown down under ordinary farming conditions, and so far as actual climate is concerned, there are few parts of Australia where *Phalaris Tuberosa* cannot be grown to advantage.

DROUGHT RESISTANCY:—While *P. Tuberosa* flourishes in localities with a comparatively high rainfall and equable climate, it has in South Australia and elsewhere proved to be **one of the best perennial grasses** for districts where the Summer months are hot and dry and the annual average rainfall is below 24 inches. The very intense and complete trials conducted some years ago by the Waite Research Institute, Adelaide, under conditions such as those previously mentioned, have demonstrated beyond doubt that *P. Tuberosa* is extremely valuable for such a climate.

Providing the **seed is sown early in the Autumn** to enable the plants to become thoroughly established before the dry weather of Summer, *P. Tuberosa* should prove well worth while for graziers in the better rainfall wheat areas.

SOWING THE SEED:—The seed may be sown from the **middle of March** till the **middle of June**, April being the ideal month in most districts. As the viability of the seed is not very high (anything over 50 per cent. being reasonably good), the surest and most economical method of establishing a pasture

PHALARIS TUBEROSA (Continued).

is to raise the seedlings in a seed bed and to transplant out any time from the end of May to August, in rows 3 ft. apart, spacing the plants from 24 to 30 inches in the rows. When raising in the seed bed and transplanting, **from 2 to 2½ lbs.** will supply ample seedlings for an acre; but when the seed is drilled in rows, **from 6 to 7 lbs.** will be required for the same area. As the seed is rather small, sow fairly close to the surface and the ground rolled after seeding.

SOIL CONDITIONS:—*P. Tuberosa* is a high production grass, and as such, is not recommended for second or third class country, but otherwise, is not very exacting in its soil requirements, and will give excellent results on from medium light to medium heavy land, providing it is of fairly good quality. Before sowing the seed for transplanting seedlings, **prepare the ground as recommended for Permanent Pastures generally** (see page 11), bearing in mind that this crop is destined to remain for a number of years and is well **worth a little extra trouble** in the initial stages of laying down.

SUBSEQUENT TREATMENT:—During the first year or two, as long as the plants permit, regular cultivation to conserve to soil moisture during dry weather is essential, but after this time the plants will have expanded until they meet each other in the rows, when, of course, no further attention in this direction is possible. Once established, ***P. Tuberosa*** is thoroughly perennial, and **grazed judiciously forms a close turf**, while if cut as soon as the flower-heads are formed, it yields a hay of first class quality.



Grazing trials with *Phalaris Tuberosa* and Subterranean Clover in association at the Waite Research Institute, Adelaide. By courtesy, Commonwealth Fertilisers and Chemicals Ltd.

A **top-dressing of Superphosphate each year, about April or May**, at the rate of **168 lbs. to the acre**, together with reasonable care in pasturing, will maintain this valuable permanent pasture in a high state of productivity for many years. Once established, *P. Tuberosa* is succulent, palatable to stock of all kinds and a strong grower, and being deep-rooted is reasonably drought-resistant, although, as previously stated, the plant is "off" during the Summer months of the year.

An alternative to the top-dressing with Superphosphate alone and one which has been **proved to give much better returns** is to use **112 lbs. Superphosphate together with 112 lbs. of Sulphate of Ammonia per acre**. The latter is to **supply the nitrogen content**, so essential to grasses of high fertility such as *Phalaris Tuberosa*. The article on **pages 44 and 45** deals fully with this associate system of manuring. Remember that the higher the fertility of any plant, the greater the amount of plant food (i.e. manure) to maintain the highest standard of productivity. For example: **Ryegrass, Cocksfoot and *Phalaris Tuberosa***, being plants of high yielding capacity, **require considerably greater quantities of plant food** to maintain themselves at the maximum standard than do poor low grade grasses—As for example: Yorkshire Fog Grass. Bearing this in mind, **treat your pastures accordingly**.

IN MIXTURES:—*Phalaris Tuberosa* is **highly sensitive to competition** from grasses, especially during the first year after seeding, and in this respect **Perennial Ryegrass is especially bad**; this is no doubt due to the slow growth of the *P. Tuberosa* in the early stages and the stronger competition of the Ryegrass. When sown in mixture, it is advisable to limit the quantity of other grasses and, indeed, better to omit other grasses altogether, excepting perhaps *Paspalum Dilatatum*.

Sown in combination with a clover only, *P. Tuberosa* does exceptionally well, the **variety of clover being selected to suit the rainfall** and other conditions where the grass is to be established. Extra Early Dwalganup Subterranean Clover, White Clover and Cowgrass all fit well in the association with this pasture plant.

SURFACE CULTIVATION

(See also notes on Soil preparation on page 11.)

When Establishing Pastures.

It has now been definitely proved that on many classes of land, the use of a plough when drilling a seed bed for Pasture Grasses is not only unnecessary, but frequently harmful.

The **advantages** of utilising a Scarifier or drastic harrow in place of the plough in pasture establishment, may be summed up as follows:—

- (1) **Fertile soil left on the surface.**
- (2) **Seed bed undisturbed.**
- (3) **Valuable native grasses not destroyed.**
- (4) **A clean seed bed for Perennials.**
- (5) **Lessens the cost of soil preparation.**

On many types of land, especially virgin country, the **surface** two inches of **soil** possesses more organic matter, and is usually of greater fertility than soil at a lower depth. When the land is ploughed to a depth of four inches or more, this comparatively rich soil is turned underneath, and the **poorer ground**, sometimes even clay sub-soil, is **left exposed** to receive the seed. Cultivation without the plough leaves the fertile soil on top, thus enabling the pasture to make a good start. As Pasture Grasses must be sown on a firm seed bed, by cultivating the surface soil **no deeper than two (2) inches** the firm seed bed is not disturbed.



The recently introduced Sun-Mulch Pasture Renovator. By courtesy, H. V. McKay Massey Harris Pty. Ltd.

The best grass grows around the gates, and on headlands. Ploughing stirs the soil deeply, and subsequent cultivations all aim at reforming the seed bed. The general desire is to **improve the carrying capacity** of the land, and farmers and graziers are often anxious to achieve this without destroying valuable native grasses, such as Danthonia, Crowsfoot, etc. The **use of the plough** in the process of soil preparation **must destroy** these native grasses, while on the other hand, a Renovator used moderately will spare the better species and at the same time form a seed bed for introduced pasture plants.

Used drastically, a renovator will destroy all surface growth, and as it cuts a wide track, may be used several times to destroy weed growth, thus **ensuring a firm seed bed**, covered by a shallow mulch practically free from weeds.

A 3-furrow plough will cut two feet and requires five horses, which will cultivate more than twice the same width with a renovator. Figures have been quoted which show that it **costs 40/- per acre** for proper soil preparation under the old system of ploughing, while the outlay is **only 14/- per acre** when a **renovator** or drastic harrow is used. While these figures may vary from district to district, there is no doubt that **surface cultivation** considerably **lessens the cost** of pasture establishment, apart from the other advantages to be gained thereby.

For surface cultivation work, three machines can be recommended:—

The **Sun-Palm Pasture Renovator**, which is excellent where drastic action is required.

For lighter surface cultivation, the **Sun-Blade Pasture Harrows**, which not only spread manure, but definitely cultivate the surface of the pasture, can be highly recommended.

Where a good two purpose machine, lower in price than the Sun-Palm Pasture Renovator, but more drastic in action than the Sun-Blade Harrows is required, the recently introduced **Sun Mulch Pasture Renovator**, which is really a "cross" between the two, is particularly suited for this class of work.

SURFACE CULTIVATION (Continued).

Cultivation of Established Pastures.

While no accurate experimental work has been carried out on the benefits of pasture harrowing, the experience of centuries has proved the value of **lightly cultivating** established pastures.

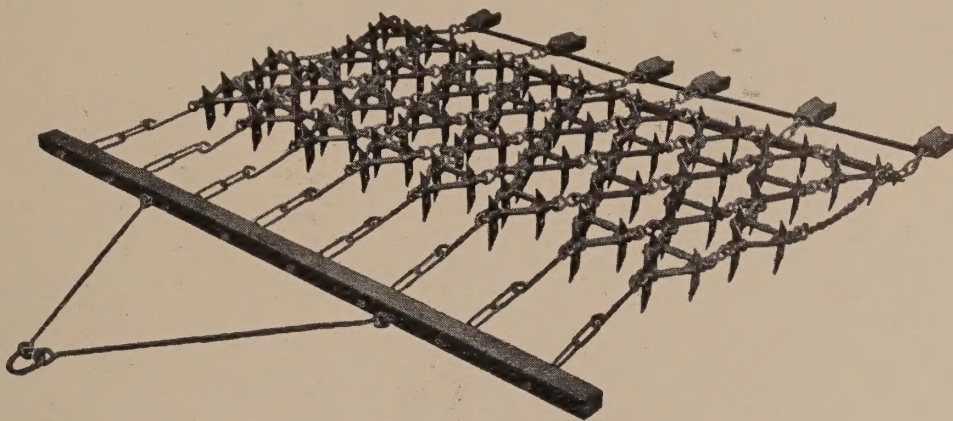
The spreading of cow droppings is important to the dairyman. The Victorian Department of Agriculture states that a **30-cow herd will produce manure** which contains the equivalent of 9 tons of sulphate of ammonia, $2\frac{1}{2}$ tons of superphosphate, and $4\frac{1}{2}$ tons of sulphate of potash, **worth** at today's market value—**£204**. If this valuable by-product is left undisturbed, it becomes harmful, killing the grass below it and causing a ring or rank growth which is unpalatable to stock.

The destruction of shallow-rooted weeds by tearing them out allows more room for deep-rooted drought resistant grasses to grow.

The opening up of soil allows moisture to penetrate easily and carry with it superphosphate which has been spread prior to harrowing. The mulch formed helps to conserve moisture.

A good seed bed for **annual grasses**, such as Subterranean Clover and Wimmera Ryegrass, can be cheaply established on medium to light soils.

One farmer states that by using 56 lbs. of superphosphate and drastically harrowing, he obtained **results equal** to a dressing of 1-cwt. Superphosphate without the use of harrows.



The useful "Sun Blade" Pasture Harrows.

SOME NOTES ON LIME

The **need for Lime** in any soil may be determined by the following simple test which will show the acidity or otherwise of the soil. The lack of this element **may mean the difference** between success and failure, hence the necessity for ascertaining its need or otherwise regularly from time to time. **The method is:—**

"Place some soil in a cup or glass with a trowel, not with the hand. Make it wet enough so that it can be stirred with a stick. Open a slit in the soil with a case-knife blade, and insert a piece of blue litmus paper obtained at a drug store. Press the soil against the paper. In an hour remove the paper. If it is distinctly pink, **the soil is extremely acid**. If it is faintly pink, the soil is slightly acid."

The action of Lime on soils is threefold—**mechanical, chemical, and biological**. By its application, clay soils are rendered more friable and easy to work, while on light soils it exercises a binding influence. It helps to set free, to be utilised by growing crops, the natural store in the soil of potash and other food constituents. It decomposes organic matter, increases the favorable bacterial action, and, as is well known, it neutralises soil sourness, and in this way is a potent ally in combating many plant diseases that have their origin in soil acidity. As Lime enables crops to utilise more of the plant foods in the soil, the inference is plain: that it is essential to apply larger quantities of nourishment in the shape of fertiliser to replace that drawn on by the growing crop, otherwise soil poverty must ensue.

Lump quicklime, also called burnt lime or caustic lime, is the best known, and still the most widely used, but is gradually being superseded by the more convenient form of ground lime. Quicklime should contain about 90 per cent. of lime; thus a ton supplies approximately 18 cwt. of pure lime.

Ground lime is coming more into use every year. It is the lump quicklime, ground to a fine powder, being more convenient to handle, and capable of being more evenly distributed—advantages that are appreciated. It should contain about the same percentage of pure lime as lump quicklime. Ground lime absorbs moisture very quickly and swells in bulk as a consequence, so is not suitable for storage in bags.

Lime is a bone builder, and should be sown on the surface and harrowed in. Half a ton per acre is the minimum to apply to produce appreciable results, but 15, 20, or even 30 cwt. per acre will be found a very satisfactory dressing to apply to all soils. In most cases, however, regular light dressings of Lime every second or third year are preferable, and better than one heavy dressing, say every 8 or 10 years.

RHODES GRASS

(*Chloris Gayana*)

Originally introduced into Australia from South Africa, Rhodes Grass (*Chloris Gayana*) is a valuable Summer perennial pasture and hay plant which develops numerous running stems. These stems root at every joint, and after covering the ground with herbage, the shoots assume an upright habit, finally reaching a height of from 3½ to 4 feet.

Rhodes Grass is **valuable both for grazing and as a hay plant**, and yields an immense quantity of nutritious and palatable herbage which is readily eaten by all stock. Where conditions (climatic and soil) are suitable, it is well worth planting on every dairy farm.

Rhodes Grass seed is of somewhat low viability, and a germination of 40 per cent. may be considered quite satisfactory, although in some seasons special samples of Rhodes Grass may show as high a germination as 75 per cent. This figure is, however, rather exceptional, and re-cleaned seed showing from 35 per cent. to 40 per cent. under laboratory test (Irish or Belfast System) will give an excellent and satisfactory strike.



Harvesting Rhodes Grass Seed in the Gayndah District, Queensland. Photograph kindly supplied by Queensland Dept. of Agriculture.

CLIMATIC CONDITIONS:—Rhodes Grass is a “tender” perennial and is **not suited** to cool and very cold localities such as Southern Victoria, Tasmania, etc., and while under such conditions, it might be successfully grown as a Summer annual, the period of growth is very limited and the first severe frosts usually kill the plants right out. It is especially **well adapted** to many parts of Queensland and New South Wales and is now being very successfully established in Northern Victoria and parts of Western Australia and other districts with mild Winters and comparatively long Summers. Reasonably warm and preferably humid weather is essential to vigorous growth, and the plant is not suited to districts with a short Summer season and long, cold frosty Winters.

CONTROL:—Rhodes Grass can be easily kept under control and is **never likely to become a troublesome weed**, even though the plants grow readily during the warm weather, spread quickly by runners and seed freely. No difficulty need be anticipated in keeping Rhodes Grass in check quite apart from the fact that the plants are cut down and often killed outright by frosts.

MIXTURES:—Rhodes Grass is unsuitable for growing in mixtures with dwarfier grasses, having a tendency to smother them, and the best returns will be secured by **sowing it alone**, especially as the plants require plenty of room for development.

FERTILISER:—The most suitable Fertiliser for Rhodes Grass is Super-phosphate used at the rate of **112 lbs.** to the acre at time of sowing. A top-dressing each year thereafter in the early Spring, just about the time that growth is commencing, with **112 lbs. Sulphate of Ammonia** to the acre will also be found most beneficial.

RHODES GRASS (Continued).

SOIL REQUIREMENTS AND PREPARATION:—Although when well established, Rhodes Grass will survive and make growth during a lengthy period of drought, a fairly moist soil gives the best results. **Deep, rich loamy ground** is the best suited to its growth, but it does well on land too alkaline for Lucerne, Ambergane, Millet, etc., and for this reason it is valuable for growing under irrigation where the irrigation water is somewhat alkaline.

Dry, sandy soil, or dry hard clayey ground is **unsuitable**, and good returns cannot be expected on this class of land.

A fine, firm seed bed is necessary to facilitate the easy penetration of the stem into the soil, and to assist in the fuller development of the plants. Plough the ground thoroughly in the early Spring, and harrow well until the surface is fine and even. Thorough soil preparation is **extremely important**, as even the very best Rhodes Grass seed is comparatively low in germination, about 40 per cent. being reasonably good, and it must also be remembered that the young seedlings are always weak in growth until well rooted and properly established.



Rhodes Grass Plants, showing its ability to propagate by runners, rooting at the nodes.
Photo. kindly supplied by Queensland Dept. of Agriculture.

WHEN AND HOW TO SOW THE SEED:—Rhodes grass seedlings in the early stages of growth are tender and liable to be injured by drought until well established, therefore **sow as early as weather conditions permit, but not before all fear of frost is over.** Under general conditions, about the **middle of October** is the most suitable period, although sowing may be carried out up to the **end of November**, and in very warm districts with a good Summer rainfall even as late as the end of December. Mid-October is preferable where conditions permit (especially in Victoria), as soil moisture conditions are then more favorable for both good germination and the quick establishment of the young plants, although for humid districts with regular tropical Summer rains, such as in many parts of Queensland, later seeding will prove equally satisfactory.

The seed is extremely light, and to ensure uniform and even distribution, mix well through with fine sand before sowing. **Broadcasting by hand** is the usual method of seeding, although when the seed is well-cleaned and free from chaff and stems, a press drill will answer very well for the purpose, but, except with high-grade seed, is liable to clog. When broadcasting by hand, **make two sowings**, using half the seed the first time, and then distribute the remainder by going over the paddock at right angles to the direction in which the first sowing was made. By this method there will be very few misses and empty spaces. Owing to the lightness of the seed, **a still, calm day** is necessary for uniform sowing, even a moderate breeze being liable to cause uneven distribution.

The quantity of seed per acre varies according to its quality and is also governed by the state of the ground, and the amounts recommended are for **Brunning's Supergrade**, re-cleaned Rhodes Grass seed, when sowing on land in good condition. Broadcasting by hand, from **8 to 10 lbs. of seed** will be required, but where the press drill method is used on well prepared soil, from **5 to 6 lbs. per acre** will prove sufficient.

After sowing, **cover the seed very lightly and then roll** the ground to compact the surface and conserve all the soil moisture possible. During dry weather, the seed will remain in the ground for some weeks without losing its germinability, but once there is sufficient moisture, growth will begin, and this moisture supply must be maintained for several weeks until the young seedlings are established, otherwise they will die off. This is generally for about seven or eight weeks, after which such a constant supply of moisture is not so essential.

RHODES GRASS (Continued).

Where irrigation facilities are available, **water the ground prior to sowing** and then broadcast the seed as soon as it is possible to get on the land. Roll after seeding if possible, but this is not feasible as a general rule under such conditions.

Should there be no rain for 10 days or so after sowing, a **further watering** must be given before the soil becomes too dry (even at the risk of washing some of the seed into patches), as the moisture in the soil from the watering prior to sowing, will have sprouted the seed, and further moisture is essential to keep the young plants going until about seven or eight weeks old.

SUBSEQUENT TREATMENT:—Owing to the nature of Rhodes Grass seed, sowing in well-defined rows is not feasible and cultivation is very seldom possible. No special attention is required until ready to pasture or cut, unless the ground is weedy, when a **mowing is advisable as soon as** the weeds are about 12 inches high, and a second mowing may be needed before the growth of the Rhodes Grass permanently checks the weeds. Once the ground is cleaned, there is little danger of the re-appearance of the weeds.

A top-dressing with some nitrogenous fertiliser in the early Spring, followed by a discing, and in dry districts an irrigation, is extremely beneficial to the pasture. Rhodes Grass is thoroughly **drought-resistant when established**, and although it may make very little growth, will live a long time without water, but after rain or an irrigation it starts away rapidly, and will be ready for cutting in about 4 weeks after.



AS A PASTURE PLANT:—Rhodes Grass was first cultivated as a pasture plant, and is still most generally grown for this purpose. It is greatly relished by sheep and cattle, recovers quickly after being eaten down and stands trampling well. The value in this direction will therefore be fully appreciated. Where climatic conditions permit Rhodes Grass to stand through the Winter, it may be pastured during the whole year, though, of course, the quantity of feed during the cooler months is much less than during the warmer period of the year.

Continuous grazing is inadvisable and too great a drain on the pasture, and it will be found more profitable to take one or two cuttings of hay, pasturing during the rest of the year, as when grown for hay a certain quantity of seed is matured and falls to the ground, so that runners are formed, which make new plants. During the grazing period, few stems or seeds are produced, and the plants **benefit by the spell**, making heavier growth during the succeeding months.

Where Rhodes Grass is alternatively pastured and cut for hay, it will generally be found better to make **hay during the warm months** of the year, and to **graze during the cooler seasons**. Even where grazing is the main object, it is always advisable to take a cutting or two for hay in the season, and where hay is the principal object, it is a good policy to occasionally graze a few animals in the paddock.

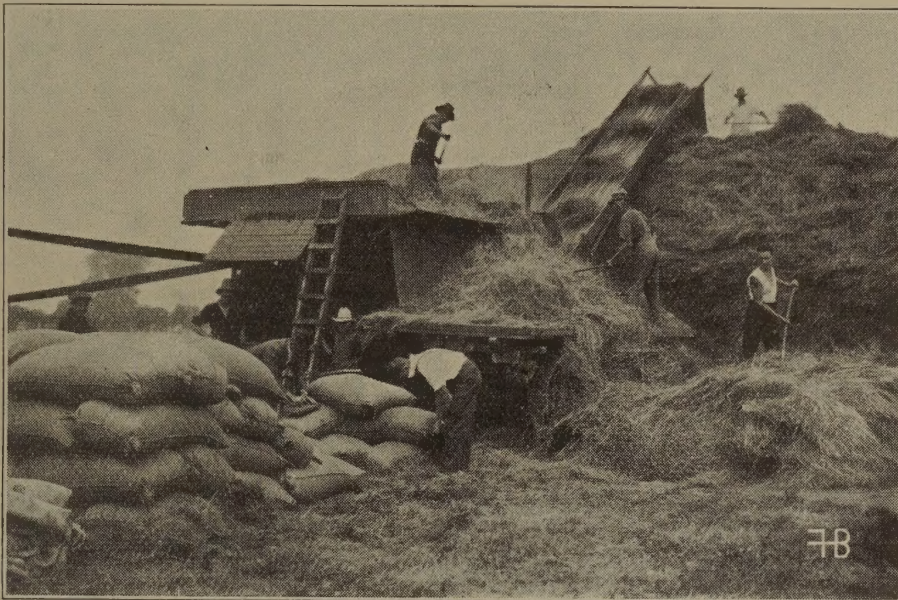
RHODES GRASS FOR HAY:—Rhodes Grass hay is **superior in quality** to that made from most other grasses, inasmuch as it contains a large proportion of leaves, while the stems are slender, tender and sweet, so that there is very little waste, and horses and cattle eat it with great relish. When grown on thin, sandy or clayey soil, with insufficient moisture, the yield may be only a ton or two per acre; but, under suitable conditions, the yields may be as much as 8 tons or more per acre. The **best time to cut for hay** is as soon as the seed begins to ripen, and in very dry districts to follow the mowing with an irrigation, so as to secure a new growth as quickly as possible, as very little new growth will be made after cutting until the soil is well moistened.

From 3 to 6 cuttings can be made during the year, about 5 weeks being sufficient under favorable conditions, for the growth of the hay crop. Some growers have taken up to 9 cuttings in a single year, but, even where obtainable, this practice weakens the plants so much that yields are considerably smaller the following season, and it is generally better to take 3 to 5 cuttings in the Summer, making the last cutting about 3 to 4 weeks before frost is expected, as there is then much less danger of damage from this agency.

GOVERNMENT CERTIFIED PASTURE SEEDS

The importance of "strain" in seeds in relation to production has brought about the development under varying conditions of soil, climate and pasture management, of several regional strains of pasture plants, which have already demonstrated their high economic importance, and the primary producer nowadays appreciates that such quality of "strain" in pasture seeds is equally as important and essential as blood in sheep, cattle, horses or other stock, with the result that there is now a widespread demand for seed of the more persistent (perennial) and leafy strains for sowing down areas of permanent pasture.

As the appearance of the seed is usually of little material assistance in determining the strain (a difficulty which was realised several years ago by the New Zealand Department of Agriculture), the only reliable means is an efficient scheme of Seed Certification. Such a system was instituted by New Zealand in 1928, thus enabling seed of genuine strains to be certified by their Agricultural Department, and sold by merchants in sealed packages. This Seed Certification has already proved of incalculable value to both the primary producer and the Seed Merchant as a standard basis of ensuring uniformity, perenniality and trueness of strain of the particular seeds included thereunder.



Officers of the N.Z. Dept. of Agriculture branding and paddock-sealing "Certified" Perennial Ryegrass as the seed comes from the threshing mill. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

WHAT CERTIFICATION MEANS

The term "**Certified Seeds**" which figures so largely in advertisements and catalogues of the seed merchants, as well as in articles by agricultural experts, may require some explanation of what it really means so as to avoid misunderstanding and confusion, and the purpose of this article is to explain what "Certification" really implies, and the several kinds of seeds which are actually under an efficient Government Certification Scheme. Any person or firm can give a certificate which **may or may not be of any value**, but the only certificate of any worth is one which marks the final steps of an efficient scheme, supervised by experienced and trained officers of an Agricultural Department, a system in which every precaution is taken to prevent deterioration in strain, errors and misrepresentation, with a view to establishing the strain purity of the seed to be certified, as well as a uniform standard basis of quality and strain, according to the especial classification given.

In addition, an efficient Government Certification Scheme **necessitates** classification and registration of each farm, as well as the field from which the seed is to be harvested. The seed must be sealed and the bags **tagged in the field** at threshing time by an officer of an Agricultural Department, and later, when dressing is to be done, the seals are removed by an officer of the Department (an independent body), the **cleaning proceeds under supervision**, and the final product, i.e., the properly cleaned seed ready for sowing is again sealed and tagged, so that from the time the seed is harvested until it is finally machine-dressed ready for sale, it is **under departmental supervision**, and while the tags and seals **remain intact**, the purchaser has every guarantee that the seed is of the strain represented by the seller.

Following this, the New Zealand scheme provides for a representative sample of each line of seed being drawn by the supervising officer for a purity and germination test, so that the analysis is definitely established by the certificate issued from their Seed Testing Station at Palmerston North. For

WHAT CERTIFICATION MEANS (Contd.).

purposes of identification, the number on the purity and germination certificate tallies with that on the tag attached to the bag of seed by the officer of the Agricultural Department, and also shows the registered farm and the district from which the seed was harvested. Finally, as a definite check on the accuracy of the work, a sample of this seed is sown out in a trial plot at the Plant Research Station, Palmerston North.

CERTIFICATION IN AUSTRALIA

In Australia, Seed Certification has not advanced to the same extent, but during the past two years, the N.S.W. Department of Agriculture, working on the same efficient methods as those in vogue in New Zealand, have very successfully established a Certification system in regard to *Phalaris Tuberosa*, and it is quite likely in 1935 that certain areas of Perennial Ryegrass will also be brought under this scheme.



Hawkes Bay Ryegrass and N.Z. White Clover under irrigation in the Murrumbidgee district, N.S.W.

The N.S.W. people, recognising the advantages of the "water-tight" New Zealand system, and benefiting by the longer experience of the Dominion officers, are working in the same efficient manner. This is especially important in connection with a permanent pasture plant, such as *Phalaris Tuberosa*, in which reliability of strain is so desirable and essential. The N.S.W. Scheme at present provides for two standards, viz., "Mother" and "Permanent Pasture."

In Tasmania, a start was made in 1932 with certifying Perennial Ryegrass, and their scheme has been very efficiently administered, the only areas eligible for the registration which is necessary to secure certification, being:—

- (1) Areas of old pasture, the plants of which are of approved type and have been sown down for not less than ten years.
- (2) Areas sown with New Zealand certified "Mother" Seed.

The Tasmanian Agricultural Department reserve the right to refuse registration of any area, as well as the certification of any seed, and any area infested with noxious weeds or onion twitch, no matter how long sown down, or however perennial as regards strain, will not be accepted for registration.

The Tasmanian system also provides for full and complete supervision by an officer of the Department of Agriculture, and it is very gratifying to know that both in N.S.W. and Tasmania the Certification Schemes adopted are proving so thoroughly efficient and reliable.

In Victoria, financial reasons have been responsible for delaying the institution of a full and complete certification scheme in connection with Perennial Ryegrass, and no such system will be in force for the 1935 harvest, but during 1933 and 1934 the Victorian Department of Agriculture, at the request of the Ryegrass Growers' Associations at Colac, Kyneton and Clunes has carried out an inspection of Ryegrass fields, and reported as to the perennality of the stands. A condition of the Department's co-operation in this respect has been that in any advertisements, etc., relating to the seed, it must be definitely stated that the Department had approved of the fields only, and undertook no responsibility in regard to the actual seed sold.

It is to be hoped that in the near future an improvement in the financial position will enable the Victorian Government to institute a full and complete Certification Scheme, on the same efficient "water-tight" lines as those now in force in New Zealand, N.S.W. and Tasmania, so that the undoubtedly persistent and desirable strains of Ryegrass, of which some quantity is now harvested, may be separately available from the lower type seed also sold as Western District Ryegrass.

SEEDS CERTIFIED BY THE N.Z. GOVERNMENT

It is now possible to purchase "Pasture Seeds" which are "certified" to by the New Zealand Agricultural Department, and which are supervised, sealed and tagged in the following:—

- New Zealand Perennial Ryegrass of the Hawkes Bay type.
- New Zealand Cocksfoot of the Akaroa type.
- New Zealand White Clover of a permanent and leafy type.
- New Zealand Grown Kentish Wild White Clover.
- New Zealand Grown Montgomery Late Red Clover.
- New Zealand Grown Italian Ryegrass of selected strain.
- New Zealand Browntop (*A. Tenuis*) certified free from Red Top.

Apart from knowledge of "strain," the analysis, i.e., the purity and germination is of great assistance in determining the value of any particular line of seed. This is of equal importance both with "certified" and "uncertified" seed, as the **"value," not the "price,"** is the factor which must be considered when purchasing Pasture and other Farm Seeds.



THE "VALUE" OF CERTIFIED RYEGRASS.

Two plots growing side by side compared under grazing on first class dairying land in the Manawatu district in New Zealand. The left-hand photo shows a plot sown with False or Ordinary New Zealand Ryegrass, while the right-hand picture is a plot sown with N.Z. Govt. "Certified" true Perennial Ryegrass. The inference is obvious as even on first class country under dairy cow management, the False or Ordinary N.Z. Ryegrass did not persist. Photos kindly loaned at our request by Mr. E. Bruce Levy, N.Z. Department of Agriculture.

Some seed sold at say 2/6 per lb. is considerably **better value**, and consequently much cheaper than another line of lower quality of the same species sold at say 1/3 per lb.

In New Zealand Government Certified Grass and Clover seeds, **two standards are recognised** by the Department, viz.:—

- (1) **"Mother"** Seed, which reaches the highest standard of strain purity. The use of this seed is especially recommended when sowing down for further seed production.
- (2) **"Permanent Pasture"** Seed, which is the product of areas sown with "Mother" Seed.

The exceptions to the preceding are **Browntop** (*Agrostis Tenuis*), of which there is only the one standard, and **Italian Ryegrass**, of which it is likely there will be two classes, viz., Certified **"Mother"** and Certified **"Commercial"** Seed. (See also pages 15 and 38).

Certified "Mother" Seed of Perennial Ryegrass is harvested almost entirely from such pastures as Hawkes Bay and Poverty Bay, in which this particular strain originated, and similarly **Certified "Mother" Cocksfoot Seed** comes almost entirely from the Akaroa Peninsula.

The Certification Scheme in New Zealand has been developed gradually, and on most efficient lines, and when first instituted was wisely restricted to Perennial Ryegrass, the list being gradually added to until for 1935, no less than seven distinct pasture plants have been included.

The same efficient and satisfactory system has been adopted both in N.S.W. and Tasmania. A few words in detail on each of the seeds certified to by the New Zealand, N.S.W. and Tasmanian Agricultural Departments may be of interest.

Hawkes Bay Ryegrass.

Many years ago, Poverty Bay Ryegrass was very popular on account of its permanency and leafiness of strain. This strain gradually spread to the Hawkes Bay district, and the latter name is now more generally used in Australia to signify the best strain of all Perennial Ryegrasses, so that **where the term "Hawkes Bay" is used**, it must be regarded as being comprehensive, and **referring to strain** as well as to both the Hawkes Bay and Poverty Bay districts.

All New Zealand Perennial Ryegrass seed which is sealed, tagged and certified is, irrespective of "Standard" **of the true perennial strain**, which has originated in the Hawkes Bay and Poverty Bay districts of New Zealand.

The field inspection which is undertaken when the crop is in ear, is to determine the purity of the strain of seed to be harvested, as it is possible to determine same at this stage, but of course the paddock has previously to be registered for inspection. The field inspection is checked and certified beyond doubt by the test plots of each line of seed which are sown out at the Plant Research Station.



N.Z. Certified "Mother" White Clover on left compared with an Uncertified N.Z. type of White Clover on the right. The plots had been laid down three years at the time of the photo., and it will be noticed that the Certified plot is entirely free of weeds and volunteer grasses. Photo. by Mr. E. Bruce Levy.

The two standards now laid down for Perennial Ryegrass are:—

Certified "Mother" Seed, which is the highest "Standard" of all, and must be from a pasture over five years old. In addition, before being certified as "Mother," a sample of seed from the pasture must be grown under trial at the New Zealand Government Plant Research Station, and found to conform to the very high degree of excellence demanded for this standard.

Certified "Permanent Pasture" Seed ranks next to "Mother" Seed in strain, and is the produce from an area sown down with "Mother" Seed, of which a sample has been sown and tested at the Plant Research Station and found to be of sufficiently high standard.

No produce is certified as "Mother" Seed without being verified at the Plant Research Station by being grown out in a trial plot, although if the pasture is of the approved type and age, and passes the field inspection undertaken when the crop is in flower, the produce will be accepted and certified to as "Permanent Pasture" standard.

New Zealand Cocksfoot.

New Zealand Cocksfoot may either be **certified or uncertified Seed**, as although the Certification Scheme has embraced Cocksfoot for over three years, there are still large quantities of seed saved from paddocks which have not yet come under the Scheme through no application having been made for registration, although this seed, both when grown on the Akaroa Peninsula or New Zealand Plains saved, may be of thoroughly reliable strain and origin.

New Zealand Cocksfoot may be divided into two Sections—**seed saved** from the old established pastures **on the Akaroa Peninsula** (the best strain of Cocksfoot in the World) and **New Zealand Plains Cocksfoot**, most of which is from Pastures originally sown with Akaroa Seed, and which is quite its equal in perennality and leafiness. Some of the New Zealand Plains Cocksfoot, may, however, have been produced from seed imported from Denmark, or other strain inferior to the Akaroa, and for that reason, certification was regarded as being especially essential. (See also reference on page 21).

Similarly to Perennial Ryegrass, two standards of strain are certified in Cocksfoot as set forth above—viz., **"Mother"** and **"Permanent Pasture."**

New Zealand White Clover.

Old Pasture New Zealand White Clover has for many years been recognised as a "strain" or type preferable to the White Dutch produced in Europe, and the demand has been for seed from old pastures on the assumption that such seed would most likely represent a more permanent strain than that from younger paddocks. For some years, the New Zealand Agricultural Department certified as "Old Pasture" Seed, the produce of paddocks five years or over.

Research has, however, shown that the **position with White Clover** was not so simple or **straightforward**, and that system was discontinued. Some "Old Pasture" White Clover has proved to be of a very leafy and permanent character, but other pastures were merely old because conditions were favorable for re-seeding, and not on account of the perenniality of the strain.

Seed which was saved from these latter pastures maintained solely through favorable conditions for re-seeding, was of no more truly permanent strain than a self-seeding annual, such as Wimmera Ryegrass or Subterranean Clover.



Three-year-old White Clover trials at the New Zealand Plant Research Station. The two plots on the left and the one in the mid-back are of the N.Z. Govt. "Certified" White Clover type. The plot on the right foreground was sown with a Dutch type of White Clover. Photo. kindly supplied at our request by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

The particular feature of the "**desirable**" strain of New Zealand White Clover is its **leafy density**, **Winter growth and persistent nature**, and under favorable conditions, this strain dominates the White Clover in the pasture, and supersedes the early-flowering and less permanent strains. For this reason, it was decided to discontinue the certification of "Old Pasture" Seed, and to substitute therefore, the certification of the remarkably truly perennial "strain," which, although only representing about 10 per cent. of the White Clover Seed harvested, is the strain responsible for the fame and popularity of New Zealand White Clover outside the Dominion.

Since 1931, the certification of "Old Pasture" has been discontinued, and all certificates applied to this Seed are now issued under the name of New Zealand White Clover, and refer to the special "truly Perennial type" with the high leafy density, heavy Winter growth and persistent nature, i.e., **the ideal form of White Clover**. This strain of New Zealand certified White Clover has proved superior to the Kentish strain of Wild White Clover in the matter of production. Two standards have been adopted, viz., "Mother" and "Permanent Pasture."

New Zealand Grown Kentish Wild White Clover.

Although the **Kentish strain of Wild White Clover** has been included in the New Zealand Certification Scheme, the development of seed production has been very slow, and it will probably be some years before any large quantity is available commercially. This reference to certified Kentish Wild White Clover is merely included here so as to present the New Zealand Scheme in its entirety.

New Zealand Grown Montgomery Late Red Clover.

The **Montgomery type of Red Clover** when compared with the Broad Red or New Zealand Cowgrass type, is slower in establishment, but much **more permanent**, and extends its period of **productivity longer** into the Summer.

Certification has in the past been confined to areas sown with stock seed imported from England, and which has proved itself to be true to type. Experience has shown that seed of Montgomery Late Red Clover produced in New Zealand has been found to conform exactly with the type imported from England, and certification is therefore now being extended to areas sown with New Zealand grown seed.

Owing to more favorable weather conditions at time of harvest, New Zealand seed is generally more plump and brighter-grained than that imported from England, which usually has a pinched and shrivelled appearance. While **Montgomery Late Red Clover** grown in England does not generally yield a hay crop and a seed crop in the one Summer, it has been found possible under New Zealand conditions, to **secure both** in the one Season, and when seed is available in greater quantity and at lower prices, this desirable strain should become popular in many parts of Victoria and Tasmania.



Montgomery Late Red Clover growing in New Zealand. It is dense crowned, multitillered and late flowering. It is quite distinct from N.Z. Broad Red Clover and Giant Colonial Cowgrass. Photo. kindly supplied by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

Government Certified Seed of the Extra Early Dwalganup Strain of Subterranean Clover will be available for the first time in 1935. Write Brunnings and secure your requirements early.

New Zealand Italian Ryegrass.

For the first time, the New Zealand Government has included **Italian Ryegrass**, under their certification scheme, so that certified seed will be available from the 1935 harvest.

The objective is a form of Italian Ryegrass of a **leafy and heavy producing type**, capable of recovery in the second year. It has been found that Westernwolds Ryegrass generally dies out after one Summer's growth, and this is not the type sought. Most of the Italian Ryegrass generally in commerce consists of an admixture of false Perennial Ryegrass, and is of relatively low production. The area registered for 1935 is not very large, and two standards are to be adopted for this, viz., "**Mother**" and "**Commercial**." The idea is on much the same lines as with Perennial Ryegrass, but to call the lower standard "Permanent Pasture" would be a misnomer with a non-perennial plant such as Italian Ryegrass.

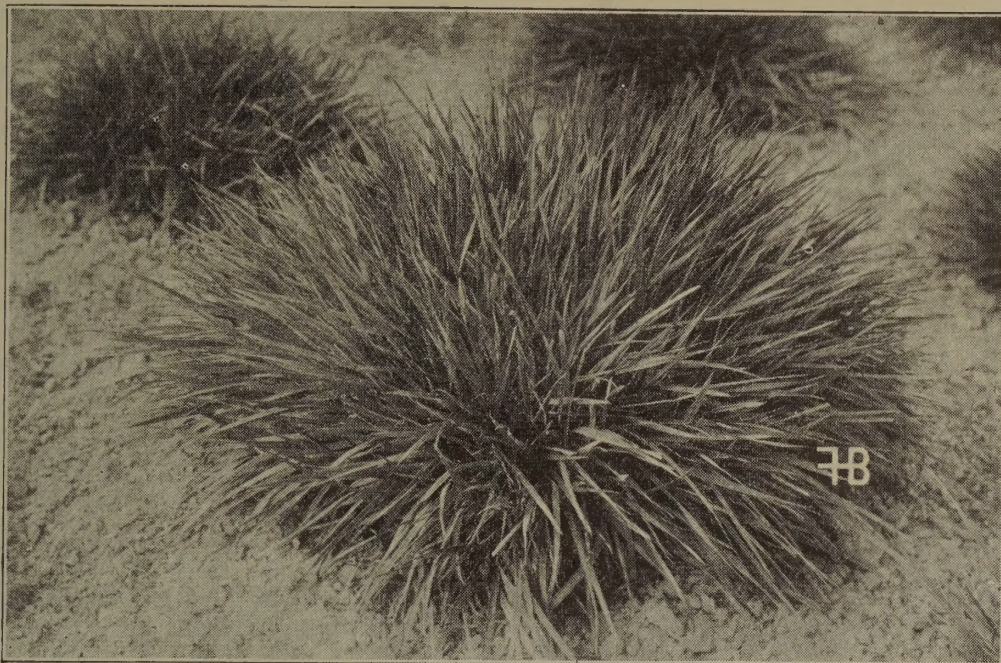
Strains which conform to the type and attain the strain purity desired will be regarded as "**Mother**" Seed, and areas sown with such "**Mother**" Seed will be eligible for entry, subject to field inspection. Other areas which may conform to type, but which are not quite pure enough for "**Mother**" Seed, will be classified as "**Commercial**" Seed. See also illustration on page 14.

New Zealand Browntop. (*Agrostis Tenuis*)

Browntop (*Agrostis Tenuis*) is a pasture grass suitable for second or third class land, and has dominated large areas of this class of country in New Zealand. The high purity and quality of New Zealand Browntop commends it to buyers both in Australia and Overseas, although its principal use here is in connection with lawn purposes, golf greens, etc. For this reason, it is very essential that the seed be **free from Red Top (*Agrostis Alba*)**, a much coarser growing species, and on that account, Browntop was included in the Certification Scheme.

There is only the one standard recognised by the New Zealand Agricultural Department, as there is really no variation in connection with perenniality, even though the types may vary slightly as with all the Bent Grasses. The **most important point**, and a feature of the certification in connection with Browntop, is the guarantee that it is **free from** any admixture of seed of **Red Top**. After passing inspection, Browntop from registered paddocks is sealed and tagged, as with certified Ryegrass or Cocksfoot, this being a guarantee of freedom from the unwanted Red Top.

Although almost exclusively used in Australia for lawn purposes, Browntop will, as it becomes better known, be more largely included as an ingredient in pasture mixtures for second and third class land. It is not suitable for sowing on first grade Country.



Single plant of Genuine Brown Top (*A. Tenuis*). This shows the true type with dense multitillered crowns, leaves erect, blades flat and of a good grass-green color. Photo kindly supplied by Mr. E. Bruce Levy, N.Z. Dept. of Agriculture.

Browntop is a member of the *Agrostis* or Bent Grass family. The Bent Grasses are dealt with on pages 18 and 19, to which the reader is also referred.

SEED CERTIFIED BY THE N.S.W. GOVERNMENT

Up till 1935, the Certification Scheme of the N.S.W. Department of Agriculture has been principally concerned with ***Phalaris Tuberosa***. This species has proved itself to be of outstanding merit for permanent pasture, and it is most essential that only **strains of proved persistency**, free from any admixture of poorer class strains, or annual types of *Phalaris* be sown.

For this reason, it is most essential that farmers should be able to purchase *Phalaris Tuberosa* Seed with confidence, and knowing that they are buying the correct strain.

The N.S.W. Department has applied the New Zealand formula and recognises two standards, viz., "**Mother**" and "**Permanent Pasture**." The basis determining each of these classifications is as shown on page 35.

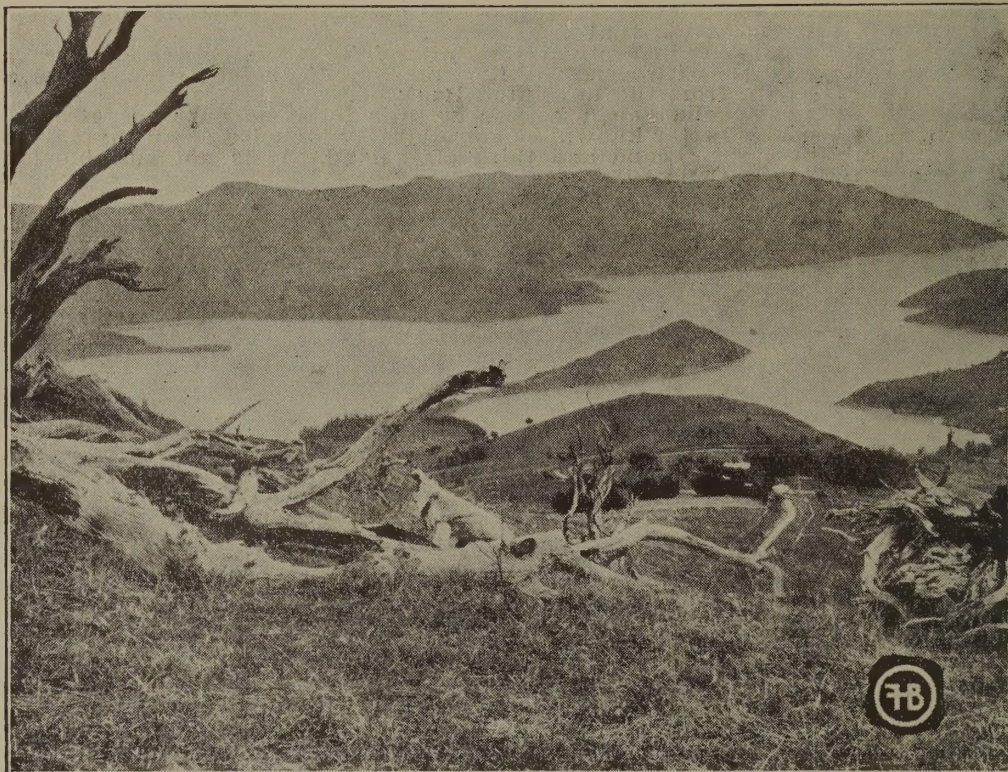
The N.S.W. Scheme is an efficient "water-tight" system, following on the same lines as that in force in New Zealand. It is probable, but not yet definite, that in 1935, some lines of old pasture persistent strain of Perennial Ryegrass will also be certified to in N.S.W.

For fuller details of *Phalaris Tuberosa*, cultural information and other particulars, please refer to pages 25 to 27.

SEED CERTIFIED BY THE TASMANIAN GOVERNMENT

The Certification Scheme in Tasmania is based on very similar lines to the efficient system in New Zealand, and it is definitely stipulated that **all certified seed must be machine-dressed** to the satisfaction of the Department of Agriculture, and that Certificates will not be issued in respect to undressed seed.

As with harvesting, the machine-dressing must be done under the supervision of an officer of the Department of Agriculture, so that from the time the seed is gathered in the paddock until it is machine-dressed, and in the bag ready for sale, it is under Departmental supervision. The only seed at present included in the Tasmanian Scheme is Perennial Ryegrass.



A good view of the hills of Akaroa, New Zealand. This is where the celebrated strain of Akaroa Cocksfoot comes from. By courtesy, N.Z. Dept. of Agriculture.

WESTERN AUSTRALIAN CERTIFICATION

To cover the 1935 harvest (Jany.-Feby.), the W.A. Govt. have instituted a certification scheme in connection with the **Extra Early Dwalganup** strain of Subterranean Clover. Full details are not available for inclusion here, but it will be gratifying to readers to know that in 1935 they can purchase seed of this "special" strain of Subterranean Clover with the full assurance that it is true to type.

GENUINE CERTIFIED SEEDS

The term "certified" is now very often used in connection with seeds as representing the approval and guarantee of the seller, but in such cases, there is no definite guarantee of strain for the purchaser, and such seed might be well bought without the use of the word "certified," and without being sealed and tagged, because it is only the reputation of the Merchant which can be accepted in assessing its strain and other value.

Readers should therefore **insist on Government Certified Seeds**, and accept only seed which has come from registered paddocks, and which has been sealed, certified and tagged by one of the Agricultural Departments.

These remarks apply to the seven lines at present under the New Zealand Scheme, as well as to Perennial Ryegrass from Tasmania and Phalaris Tuberosa from N.S.W.

Don't be satisfied with the mere word "certified," and always make a point of ascertaining by whom the seed is so guaranteed, or in other words, always insist on having Government Certified Pasture Seeds in such species as are at present available under the system.

This information has been kindly **supplied** and this article **checked** by the New Zealand, N.S.W. and Tasmanian Departments of Agriculture (independent bodies), who carry out the inspection of crops, supervise the produce and seal, tag and certify the seed.

CHEWINGS FESCUE

(*Festuca duriuscula*)

Chewings Fescue which is well-known as one of the best of our lawn grasses where a close fine-textured true even turf is required as for a putting green or croquet lawn, is **seldom used in agriculture in Australia.**

It is a true perennial and thoroughly permanent when once established, but requires from a **cool to cold** climate and a district with a fairly **heavy annual rainfall.** As such it should be suitable for many parts of Gippsland. On poor light soils where most other grasses will not thrive, it forms a good sward and yields abundant pasture of high palatability and good feeding value.

Sown alone, **20 lbs.** of seed is required for an acre, but when included in mixture with other Grasses and Clovers, the quantity varies to from **2 lbs. to 5 lbs.** per acre according to the other ingredients used. As the seed is liable to lose its germination quickly after twelve months, it is necessary to purchase recently harvested stock and in this respect **Brunning's Supergrade Extra Heavy Machine Dressed** quality can be highly recommended.



Typical Chewings Fescue country in the Southland of New Zealand. It will be noticed that the Fescue is dominant on the pasture.

Brunning's "Service" is free and no charge is made for quotations, information or suggestions. Write to Box 857.K., Melbourne, any time you are in need of advice regarding your Pastures.

KENTUCKY BLUE GRASS

(*Poa Pratensis*)

Kentucky Blue Grass, like Chewings Fescue, is most generally used for lawn purposes, but in America and elsewhere, it is a **valuable permanent pasture** grass especially recommended for comparatively dry localities.

It is **not** adapted to heavy moist soil, but gives excellent results on fair quality ground and should **not** be sown on first class land and rich river flats. It is of semi-creeping habit, but never likely to become a pest as it can be easily eradicated. It is one of the best Winter grasses for dry lands and yields a large quantity of palatable and nutritious herbage during the Autumn, Winter and early Spring.

Where there is a good Summer rainfall, it continues to make growth and is, under such conditions, practically an "all-the-year-round" pasture.

In association with other Grasses and Clovers, sow from **2 lbs. to 4 lbs.** per acre, but when seeded alone from **20 lbs. to 25 lbs.** will be required for the same area. Kentucky Blue Grass is slow in germinating and may take from three to four weeks before making an appearance. The preceding quantities are based on using **Brunning's Extra Heavy Supergrade Re-cleaned Seed.**

TIMOTHY

(Phleum Pratense)

Timothy Grass is perhaps not so well known in Australia as its merits deserve, but in America and Europe it is **one of the leading hay grasses**. The plants grow in stools and have no spreading root system, but owing to their readiness in seeding, form a perfect sod under favorable conditions. Timothy is a **perennial grass**, the root varying in character, being fibrous on moist soils and inclined to be bulbous when grown on drier ground. The plant is a native of America.

Timothy is **seldom grown alone**, being generally sown in mixture either with Ryegrass, Cocksfoot and Clovers or grown in conjunction with either Cowgrass or Alsike Clover.

SOIL:—Gravelly land is unsuitable, the best results being obtained on moist land, and Timothy will withstand a considerable amount of moisture. For that reason it is **valuable** for growing under **irrigation** conditions. Land well supplied with humus, such as river flats, yields the best results, although it will grow well on stiff clay ground, providing it is well watered. In any case, Timothy being mostly a surface feeder must be **regularly supplied** with moisture.

SEED SOWING:—The seed should be sown in the Autumn or early Winter, and when grown alone, **30 lbs.** will be required for an acre. When sown in **mixture** with other Grasses and Clovers combined, from **2 lbs. to 4 lbs.** per acre is used, according to conditions. For other quantities, see below.

GENERAL:—Timothy is **not a good grass** for growing alone **when grazing** is the requirement, as the plants are apt to be pulled out or injured by the trampling of the cattle. **Sown alone**, its use should therefore be confined to cutting for **hay**, for which purpose it should be taken in the young stage as the plants become woody and hard even when cut before the flowering stage. Owing to the habit of growth, Timothy is especially valuable for growing with Clovers for **preventing lodging**.

MIXTURES:—The use of Timothy in mixtures is to be recommended where ample moisture is available. Timothy (**20 lbs.**) and Cowgrass (**4 lbs.**) per acre makes a first class association as the high protein content of the clover supplements the carbohydrate content of the grass. Timothy (**12 lbs.**) and Alsike (**3 lbs.**) per acre is another valuable mixture, especially for irrigation conditions.

Prairie Grass is a first class Winter Permanent Pasture. Read the article on page 24.

WALLABY GRASS

(Danthonia)

A Splendid Pasture Plant for Sheep Country.

The Wallaby Grasses or Danthonias are found in many parts of Australia and New Zealand, and are extremely **valuable as permanent pasture plants** on dry uplands, owing to their excellent stock fattening qualities. Where Rye Grass, Cocksfoot and the better Clovers will not grow, or where they only persist for a few years, Wallaby Grass makes a splendid pasture and is especially suitable for cleared hill country and poor class land.

VARIETIES:—There are many species of Wallaby Grass, but the best of the cultivated varieties of which seed is available commercially, are **Pilosa** and **Semi-Annularis**. Both species are thoroughly permanent in character, extremely hardy, enduring both heat and very cold conditions, and will stand being very heavily stocked. These two varieties are quite distinct in habit, **Semi-Annularis** having longer leaves and growing somewhat erect and tussocky, while **Pilosa** is **dwarfer**, and forms a comparatively close sward.

It is essential to keep **Pilosa** well eaten down as it thrives on heavy stocking, and kept closely cropped it will form a thick, level sward, producing a considerable quantity of fairly succulent and nutritious herbage. **Semi-Annularis** is a native of Australia, while **Pilosa** is said to have originated in the North Island of New Zealand.

UTILIZATION:—**Pilosa** is the **better for all general purposes**, and excepting for scrub or fern country where burning-off is necessary from time to time, is much the superior variety.

Semi-Annularis is **recommended**, where **burning-off** is necessary, as its taller and drier growth is so much better adapted to carrying a fire. Second and third class country which has originally been sown with Rye Grass, Cocksfoot, etc., and on which these higher production plants will not persist, will in time become almost pure **Danthonia** pasture, and as the best of this type of land will, under Wallaby Grass, carry two sheep to the acre, the value of **Danthonias** for poor class ground will be realised.

QUALITY OF SEED:—The fluffiness and lightness of the seed makes machine-dressing extremely difficult, and commercial samples generally include a large percentage of impurities in the shape of Hair Grass, Yorkshire Fog Grass, etc. None of these are likely to be serious on the type of land on which Wallaby Grass should be sown, and the admixture therefore cannot be looked upon as harmful.

For the reasons given therefore, first grade quality seed, both of **Pilosa** and **Semi-Annularis**, has a very low percentage of purity as well as a comparatively low viability. A growth of **anything over 40 per cent.** may be considered reasonable, although a good commercial sample may sometimes show a germination as high as 70 per cent. This, however, **must not be accepted** as a general standard of comparison.

WALLABY GRASS (Continued).

SOIL:—Wallaby Grass is not advocated for permanent pasture on rich country, and **should only be sown on land** where Rye Grass, Cocksfoot and the better Clovers will not succeed, or, at the best, die out in a year or two. *Danthonia* is seldom seeded on ploughed land, except under special conditions, but is generally sown on the ashes of third-class forest land, or on burnt scrub or fern country.

SOWING THE SEED:—The quantity of seed varies according to conditions, and sown by itself, from **10 to 15 lbs.** is broadcasted **per acre**. The **best** and most effective **method** of establishing Wallaby Grass, especially on country where the better Grasses and Clovers will only stand for a few years, is to **sow in a mixture**, in which case from 3 to 4 lbs. of Wallaby Grass per acre is ample. This method has an added advantage as Wallaby Grass is very slow in the early stages of growth and generally takes about two years to establish itself.



Danthonia Semi-Annularis growing on poor grassland country. Note the tall growing habit, which enables it to carry a fire so well.

Phalaris Tuberosa and Extra Early Dwalganup Subterranean Clover grow splendidly in association together. This is an excellent mixture for districts of comparatively low rainfall. Sow $4\frac{1}{2}$ lbs. *Phalaris* and $1\frac{1}{2}$ lbs. Subterranean Clover per acre.

Where cost precludes the use of Rye Grass, Cocksfoot, etc., Yorkshire Fog and Wallaby Grass make a good mixture, using 20 lbs. of the former and from 4 to 5 lbs. of Wallaby Grass per acre. These quantities apply to **Bunning's Supergrade Quality Seed**.

Although fairly slow in developing (hence the advisability of using other grasses to cover the land rapidly), when once established it spreads quickly even when fairly heavily stocked owing to its habit of seeding. Seed may be sown from the **first Autumn rains in March**, up to about the end of June.

Wallaby Grass is sown broadcast by hand, and as the seed is very difficult to scatter evenly, owing to the seeds matting together, the only way to **ensure uniform distribution** is to mix it thoroughly with some clean, dry, sand to separate the grains as much as possible; in windy weather, it is almost impossible to distribute the seed evenly, therefore it is necessary to choose a comparatively still day for sowing. The viability of Wallaby Grass seed may be as much as 70 per cent., but it is very variable, and an average germination of 40 percent. (under test) may be considered thoroughly satisfactory. These remarks apply equally to *Pilosa* and *Semi-Annularis*.

GENERAL TREATMENT:—Sowing in mixture with other Grasses and Clovers is very desirable as Wallaby Grass gives practically no feed the first season, although when established it grows rapidly and must be kept heavily stocked, otherwise the plants become coarse and woody. Wallaby Grass **stands frosts well**, and *Danthonia Pilosa* will make **good growth during the Winter** and yield very palatable feed. For this further reason, it is generally regarded as superior to *Semi-Annularis*, and its average carrying capacity may be taken as fairly high. **Apart from heavy stocking** to keep the plants well **grazed down**, **no special general treatment** is necessary.

WINTER GROWTH FROM PASTURES

The Necessity for Scientific Application of Nitrogen.

Grasses as a group of plants differ from Clovers in being unable to fix nitrogen from the atmosphere. Consequently, **grasses are unable to thrive in soils which are low in available nitrogen.** These facts explain the slow spread of good grasses when nitrogen is deficient and the rapid spread of Clovers when phosphates only are applied to a soil.

The question may be asked: "Why do not good pasture grasses spread at the rate of the poorer grasses"? For instance, why does not Ryegrass spread to the poor parts of the farm as do grasses such as Hair or Silver Grass (*Festuca bromoides*) and Brome Grasses (Goose Grass, etc.)? The answer lies in the statement that the **best grasses are the highest producing ones and they demand heavy supplies of available nitrogen** in the soil. Hence they do not thrive on poor or "low fertility" soils. On a soil which is short of nitrogen the grasses which demand little nitrogen will survive to the exclusion of the "high nitrogen demanders." This explains why in so many sown pastures the better grasses are gradually replaced by poor types.



Stock fattening on a top-dressed pasture.

Brunnings were First in 1852. Still First in 1935.

There is ample nitrogen present in most Victorian soils during the Spring and Summer for the requirements of even the best grasses. However, the supply is low during the cold months, from May till September, and the high producing or "high fertility" grasses are nitrogen starved, become stunted and shrivelled, and finally give way to the more hardy but less productive types.

BETTER GRASSES AND LESS WEEDS:—Thus it will be seen that to establish and maintain a pasture containing "high fertility" grasses, it is essential to feed that pasture firstly, with phosphate the year round, and secondly, with nitrogen, during the Winter months when natural soil nitrogen is at low ebb. The former is rendered easy since Superphosphate is a relatively insoluble fertiliser, and an application at the rate of 2-3 cwt. per acre once a year, preferably in the Autumn, will maintain a continuous supply of available phosphate for at least twelve months. Nitrogen in the form of Sulphate of Ammonia, however, is very soluble and immediately available. Consequently, it should not be applied till required by the plant.

The principal pasture grasses in common use which demand heavy nitrogen supplies and will repay the expense of annual dressings of sulphate of ammonia are as follows:—

**Wimmera Ryegrass.
Perennial Ryegrass.
Italian Ryegrass.**

**Phalaris Tuberosa.
Cocksfoot.
Prairie Grass.**

Pasture mixtures containing these grasses should be seeded with superphosphate and at least 1 cwt. sulphate of ammonia per acre in the Autumn. A further dressing of 1 cwt. sulphate of ammonia per acre alone during the latter half of July will firmly establish these high fertility grasses and keep up a healthy, vigorous growth till the advent of warmer weather and ample supplies of natural soil nitrogen in October and November. Many pastures are ruined in the first few months of establishment by an invasion of weeds, but if vigorous grass growth is maintained during the Winter, with a good supply of nitrogen this danger will be largely eliminated.

WINTER GROWTH FROM PASTURES (Continued).

MORE GRASS WITH NITROGEN:—A further valuable use of nitrogen is to prevent the clovers becoming dominant in pastures. Much trouble is experienced in Victoria annually by excessive clover diet, causing bloat and kidney disease in stock and "clover taint" in milk.

By the annual use of nitrogen, in addition to phosphate as explained above, a correct balance between grass and clover will be maintained. If, however, a pasture has become clover dominant, the quickest way to increase the grass content is to re-seed with grass, harrow and use nitrogen. The pasture should receive a drastic Autumn harrowing, followed by a fairly heavy re-seeding with good grasses, such as Wimmera Ryegrass for dry areas, or Perennial Ryegrass and Cocksfoot, where the rainfall is above 25 inches. This re-seeding should be followed by a further drastic harrowing and an application of 1-2 cwt. per acre Sulphate of Ammonia in April and a further dressing in July, as explained earlier. In extreme cases the use of Superphosphate should be discontinued for a year or so.

This information is based on recent experimental work carried out throughout Victoria, and should help Victorian farmers to obtain higher production and more profit from their pastures.



Top dressing on Mr. Stockdale's Farm at Kyneton. By courtesy Commonwealth Fertilisers and Chemicals Ltd.

NITROGEN FOR WINTER GROWTH:—In addition to improving the establishment of highly productive pastures, continued nitrogen applications to this type of pasture pay handsomely by producing valuable Winter grass. The great value of succulent Winter feed from pastures, particularly from the point of view of dairy farmers and fat lamb raisers, needs no elaboration here. Recent experiments in Victoria have shown that nitrogen applied at the correct time to the correct pasture gives the cheapest form of Winter feed.

Applications of Sulphate of Ammonia should be made to pastures containing ample "high fertility" grasses, firstly in the Autumn for May/June/July growth and again in July for August and September feed. This is necessary since Sulphate of Ammonia is a quick acting fertiliser, giving a flush of feed for the ten or twelve weeks immediately following application. Such applications of Sulphate of Ammonia in addition to giving Winter feed, will improve general soil fertility and help to maintain the better grasses.

The following precautions are necessary for best results from dressings of Sulphate of Ammonia:—

1. April and July are the best months for application.
2. Application should not be made in April unless the soil has been well saturated previously by good Autumn rains. If Autumn rains are late, delay the application till May or July. June is a bad month for application.
3. About the middle to the end of July is best for the Winter application.
4. Top-dressing should be applied when the grass is well grazed down.
5. The grass should NOT be wet when Sulphate of Ammonia alone is applied. Wait till the grass dries or top-dress when it is actually raining.
6. 1 cwt. per acre is the least quantity per acre that should be applied. 1 to 1½ cwt. is the best application.
7. Superphosphate should be applied as usual.
8. A poor light green or yellow color and dark green patchy growth here and there are indications of extreme nitrogen deficiency, and a dressing of 1 to 2 cwt. Sulphate of Ammonia will revive such pastures.
9. July seems to be the best month for application of nitrogen to Gipps-land pastures.

WIMMERA RYEGRASS

A Most Desirable Winter and Spring Grass.

Wimmera Ryegrass (*Lolium Subulatum*) is a species of highly drought-resistant Ryegrass of high feeding value, of the origin of which little is known. It was first discovered in Australia, in the Wimmera district of Victoria, and is most likely a natural cross between the native grass (*L. Rigidum*) and either Italian or Perennial Ryegrass. Generally speaking, it matures earlier than either of the two latter, but there are many strains with very considerable variation in type. The best are leafy and succulent, while others are stemmy, wiry and harsh. Most are definitely annual, a few odd types showing a perennial habit, while some are early maturing, with others relatively late.

A commercial sample of Wimmera Ryegrass may contain a complexity of strains, so that regular and frequent re-selection is essential to preserve the best quality and most highly productive types intact. In spite of the greatest care, there may be slight variations even in the best contract grown seed, but the plants produced will only vary slightly, while the bulk will be found to be of the most desirable type.

It is therefore essential to **buy Wimmera Ryegrass seed from reliable Seed Merchants** whose crops are regularly inspected and carefully supervised to maintain the strain at the highest possible standard. In this respect, **Brunning's Special Contract-Grown Wimmera Ryegrass seed** can be confidently recommended.



"Mesgawi" Berseem Clover is a wonderful Winter fodder. Grown in mixture with Skinless Barley it yields several cuttings in the season and provides a well-balanced ration for stock.

Trials conducted by the Department of Agriculture at the Horticultural Gardens, Burnley, show the difficulty in maintaining any one strain or type 100 per cent. pure, but the most desirable variations are being carefully selected and isolated, so that in the near future it may be possible to put on the market **properly certified seed** which can be relied on to produce the characteristics of its parent to the fullest extent.

UTILITY:—Wimmera Ryegrass may be **grazed**, **cut for green feed**, or if desired, the last growth may be **saved for hay**, which is of splendid quality and excellent feeding value. Once established, the plant is **fully permanent**, and by heavy seeding will re-appear year after year. In the earlier stages of growth it is extremely palatable and maintains its palatability through the season, although if allowed to get too long in seeding there is a large amount of waste, as stock do not relish the dry stalks after the seed is shed. The plants should therefore be grazed short and only allowed to run to seed when the dry period is beginning to set in, but at the same time it **should not be pastured late enough** to prevent reasonable seed formation.

IN MIXTURES:—Wimmera Ryegrass associates well in mixture with both the **Extra Early Dwalganup** and the **Mid-season or Mt. Barker** types of Subterranean Clover. A good general sowing is **15 lbs.** of Wimmera Ryegrass and **2 lbs.** Subterranean Clover (either strain) per acre. **See also** the articles on pages 64 and 66.

The **Extra Early Dwalganup** Subterranean Clover/Wimmera Ryegrass mixture should prove **exceptionally valuable** for hot, dry districts with an annual rainfall of from **15 to 18 inches** per annum and where the Spring is short and the Summer usually of long duration with extremely hot and dry weather.

WIMMERA RYEGRASS (Continued).

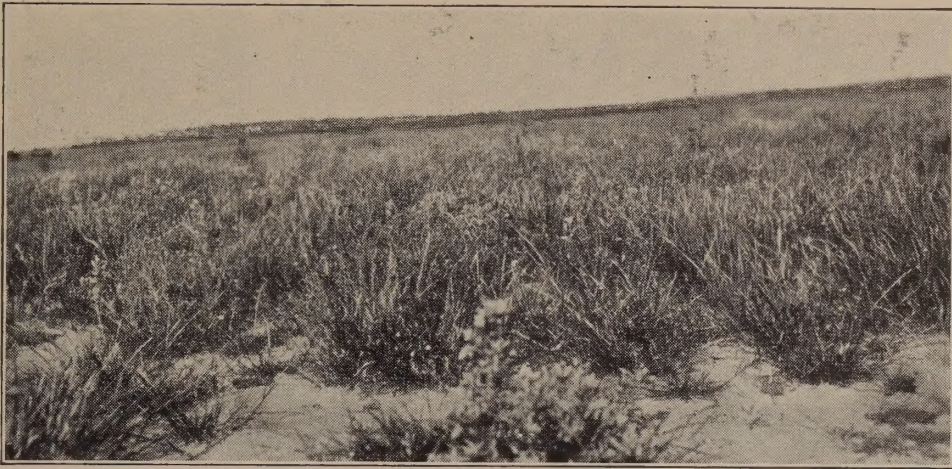
WHERE CAN IT BE GROWN:—Wimmera Ryegrass is **most adaptable to climatic conditions**, and in localities with a high rainfall will thrive on second or third class country, but in districts with very light average rainfall, soil of greater fertility is necessary for the best results. Its chief value, however, is on low class types of red soil and on the classes of country in the Wimmera and Mallee of Victoria, which are of too poor quality to be productive to Wheat, but owing to its very wide adaptability it is a most valuable addition to our Permanent Pasture plants.

SOIL REQUIREMENTS:—In districts of high rainfall, Wimmera Ryegrass **should not be sown on good quality soil**, but in drier areas better class land is necessary if plants are to hold and give the maximum results.

No special soil preparation is necessary, providing the ground is harrowed or sufficiently loosened to make a seed bed to enable the roots to get a hold. With very heavy or stiff soil, more thorough preparation of the land is essential.

WHEN AND HOW TO SOW:—The best time for sowing the seed is with the first Autumn rains, but Wimmera Ryegrass may be **sown from March until about the middle of June**. Owing to the habit and nature of the plant, later seeding would hardly be advisable, except in very moist districts, when early Spring sowings may be successful.

The seed, when sown alone, is **broadcasted**, in which case from **15 to 20 lbs. per acre** is sufficient, or it may be sown with a cereal crop on land which it is proposed to rest. In such case, a light seeding only is necessary, otherwise the cereal crop may be interfered with, and under these conditions about 2 to 4 lbs. of seed per acre will be found sufficient.



Wimmera Ryegrass growing and establishing itself in Saltbush Country.

See pages 33 to 40 for full details of Certified Pasture Seeds and a complete explanation of the Government Certification Schemes now in force. Certified Pasture Seeds are the Best Value.

THE SEED:—To be sure of getting the genuine Wimmera Ryegrass, purchase your seed from a reputable House, and in this respect you cannot do better than use **Brunning's Genuine Contract-grown stock**. There are so many variations of Wimmera Ryegrass that it is advisable to purchase reputable seed saved from paddocks which have been supervised to ensure as high a percentage of the best quality types as possible.

SUBSEQUENT TREATMENT:—If the grass is required for permanency, judicious grazing is necessary at seeding time, especially during the first season. In any case, it is advisable to shut up the paddock the first season in the early Spring to give the plants an opportunity of seeding themselves heavily. Apart from this, no special treatment is necessary until the following Autumn, when the paddock should be harrowed to give the seed an opportunity to start with the first Autumn rains, and at this stage, a top-dressing of 112 lbs. to 168 lbs. of Superphosphate per acre, according to the class of land, followed by an application of 84 lbs. per acre of some Nitrogenous Manure (such as Sulphate of Ammonia) about the end of April or early in May, will materially benefit the pasture.

GENERAL:—Wimmera Ryegrass (*Lolium Subulatum*) may be briefly summarised as **an annual withstanding dry Summer conditions and re-seeding itself profusely** if managed judiciously. Fed in conjunction with Clover, it yields an excellently balanced ration of high feeding value and is at its best stage of palatability in the Winter. Wimmera Ryegrass is **not attacked by** such pests as the **Red Spider and the Lucerne Flea**, and produces good fodder when Clovers are suffering from the ravages of these insects. It grows profusely in areas with an annual rainfall as low as **15 inches**, providing the general fertility of the soil is high enough. Wimmera Ryegrass helps to **counteract the "Clover Taint"** in butter and **responds** most readily to balanced **top-dressing** with Superphosphate and Sulphate of Ammonia to give feed during the Winter.

MANGEL AND SUGAR MANGEL

The **Mangel** or Mangold-Wurzel and the **Giant Half Sugar Mangel** (herein referred to as Sugar Mangel for the sake of brevity) are highly productive members of the Beet family, supplying a valuable and profitable **well-balanced ration** suitable for feeding all kinds of stock. Owing to the facility with which the roots can be stored and used for feeding during the lean portion of the year, Mangels and Sugar Mangels are worth growing on every holding in districts where climatic conditions are suitable for their successful cultivation.

The **Sugar Mangel** is the **more nutritious** of the two, and possesses greater feeding value, although the roots are not quite as large as those of the Mangel. It is, as the full name will suggest, a cross between the Mangel proper and the smaller but more highly nutritious Sugar Beet, combining the good qualities of both.

The cultivation and general requirements are essentially the same for each, hence the grouping together in this article.

CLIMATE AND SOIL:—The Mangel and Sugar Mangel both require a cool climate and a reasonably moist soil, thus being well adapted to districts with a good Summer rainfall. They are not very exacting in their actual soil requirements, and yield payable results even on country of a saline nature.



The root system of both is extensive, and the **ground should therefore be deep**, or where shallow, over a fairly open sub-soil. The heaviest yield of roots will be produced on rich alluvial land and deep clay loam of a friable nature. When grown on this class of country, little or no resistance is offered to the downward growth of the roots, which, when matured, are clean and well developed.

Stony ground and very stiff, compact soil **prevents** the free development of the root, owing to the resistance offered to its expansion and there is always the possibility of the **roots becoming forked** when grown on this class of country.

SEED:—This is a very important factor in the success or otherwise of the resultant crop, and only seed of the highest quality strain should be sown. The most productive varieties of Mangel are—**Brunning's Mammoth Long Red** and **Brunning's Champion Yellow Globe**, the **former** being more suitable for sowing in **deep rich, well-worked ground**, while the **latter** is adapted to **more shallow soils**. There are two varieties of Sugar Mangel of about equal merit, which only differ in the color of the top. These are known as **White** and **Rose** respectively.

SOIL PREPARATION:—Very **thorough preparation** is necessary to bring the ground into that deep friable condition essential to the free expansion of the roots, and to **enable** the feeding rootlets to penetrate easily and to come into close contact with every part of the soil. When the ground is left in a rough, cloddy condition, **root growth is checked**, the crop prevented from drawing on the constituents it requires, and there is a great **possibility of forking**. Large quantities of plant food are necessary, as the plants are gross feeders, and the soil **must be worked deeply** to extend the area which can be exploited by the roots in their search for this food. Ample moisture is also required to induce successful germination and ensure subsequent development.

Prepare the land **as early as possible**, and should the ground be moist when the first ploughing is given, **harrow** immediately; while if it is dry, work the surface **as soon as** sufficient rain falls to moisten the clods. This brings the soil into a fine, firm condition, favorable to the absorption and retention of moisture, and breaks up the large open spaces which, by admitting too much air, tend to hasten evaporation, and thus dry out the ground. **Plough again** very lightly, just before seeding, finally bringing the soil by means of the harrows and cultivator, to a very fine tilth to ensure successful ger-

MANGEL AND SUGAR MANGEL (Continued).

mination, thus the ideal condition before sowing may briefly be described as a **fine mellow seed bed**. It is essential that the sub-soil is well drained.

MANURING:—Mangel and Sugar Mangel are exhaustive crops, and cannot be successfully grown on the same land two years in succession. These crops need Phosphoric Acid, as well as a large amount of Potash, and the use of a **Complete Fertiliser gives the best yields**. From **168 lbs. to 224 lbs.** per acre of fertiliser, according to the quality of the land, will be required, and a mixture of Superphosphate, Sulphate of Ammonia and Potash, will be found the most suitable. The quantity of fertiliser per acre also depends on the **amount of farmyard manure** available for use.

SEED SOWING:—Seed may be sown from the **end of September** to the **end of November**. Sow Mangel in rows from **36 to 48 inches** apart, using **4 lbs. of seed** per acre, but as **Sugar Mangel** produces a smaller root, rows from **21 to 24 inches** apart, seeding at the rate of **6 lbs. per acre**, will be found sufficient distance apart. The Seed may be sown either by hand or by drill. **After seed-ing**, draw a light roller over the ground to compact and firm the soil around the seed. **Without this** rolling after sowing, germination is liable to be patchy. **The germination** of both Mangel and Sugar Mangel may be hastened and **improved by soaking** the seed prior to sowing.

SUBSEQUENT TREATMENT:—When the seedlings are well above the ground and can easily be seen in the drills, **scarify lightly** between the rows to loosen the soil, and to destroy any weeds that may have sprung up. Any strong growing weeds that appear in the rows before the plants are ready for thinning out must be carefully pulled by hand. When the plants are from 3 to 4 inches high, **thin out** to about 4 or 5 inches apart; this is usually done with a hand hoe. The plants are **later on further singled** out by hand, so as to leave plenty of room between each for the final development of the good sized roots. Thin out the **Mangel seedlings finally** to from **15 to 18 inches** apart, and **Sugar Mangel** to **12 inches** apart.



Mangel Champion Yellow Globe.

After the final thinning out, the only attention necessary until the roots are ready for lifting, is to **scarify occasionally** between the rows, and to **hoe the ground** between the plants. If the land is worked three times before thinning out, once more will generally prove sufficient, as cultivation can only be practised while the plants are comparatively small; when they have grown sufficiently to meet each other in the rows, they will smother any weeds that may then appear.

HARVESTING:—Mangels and Sugar Mangels **should be carefully pulled**, the adhering soil shaken off and the top cut or twisted off just above the crown. The easiest method is to take out a deep furrow on each side of the row with a plough, and there will then be no difficulty in lifting the roots. The crop takes 6 to 7 months to reach maturity, which is indicated by the stoppage of growth and the leaves becoming yellowish and wilted. Delay harvesting until maturity is reached, so as to get the highest yield and best quality. Immature Mangels and Beets may be fed in small quantities to pigs, but not to cows as they impart a bad taint to milk, and are likely to cause scouring. No bad effect will follow the feeding of matured roots.

STORING:—When Root Crops are intended to be stored, the leaves, together with all earthy matter, must be removed and the roots thoroughly cleansed, although this is really necessary in any case. **To store successfully**, it is necessary to provide protection against frost, prevention against sweating, an even temperature and good ventilation to carry off the gasses that are likely to accumulate, and to guard against the damp which is likely to cause decay, or too dry a place which may cause the roots to shrivel. **The best method of storing** Mangel and Sugar Mangel is to place on a bed of straw in a well-ventilated shed in stacks about two feet deep; but where sheds are not available the roots can be kept fairly well by stacking on dry straw on a well-drained piece of land in the open.

Mangels and Sugar Mangels are most suitable for feeding pigs, cows or stud sheep, because of their succulent and palatable nature. The Sugar Mangel has the highest feeding value of all root crops, the Sugar Beet coming next.

SWEDE AND FIELD TURNIP

These two fodders are very valuable for feeding stock, especially sheep and lambs, and are very largely grown for this purpose. The roots may either be used fresh or stored, and will keep in good condition for from eight to ten weeks, thus being available for use through the Winter as required.

CLIMATE AND SOIL:—Swedes require a damp and rather dull climate with an annual average rainfall of 22 inches or more, and do not stand continued dry weather well. They thrive well on from medium to sandy loam, or will give good yields even on comparatively heavy ground. **Field Turnips**, while needing a fair amount of moisture, can be successfully grown on drier land than Swedes, and good crops will be obtained on soils varying from the poorest sand and gravel to the richest loam. Swedes will give the best results under such climatic conditions as the North-West Coast of Tasmania, Gippsland, and parts of the Western District of Victoria. **Field Turnips** are much wider in their adaptability to districts, and can be successfully cultivated in many other parts of the Commonwealth.

SEED:—As with Mangel, Pasture Plants and other fodders, "strain" is a very important item when purchasing seed of either Swede or Field Turnip. All **Brunning's** Swede and Field Turnip Seed is grown from selected roots, true to name and type, and is of the highest quality and most productive strains.



Field Turnip, Purple Top Yellow Aberdeen.

Extra Early Dwalganup Subterranean Clover is a wonderful fodder for the Northern Districts of Victoria and the Riverina. It grows splendidly in association with **Wimmera Ryegrass**. See also pages 64, 65.

VARIETIES:—The best Swedes for Australian conditions are **Champion Purple Top**, **Elephant Purple Top**, **Skirving's Purple Top**, **Superlative** and **Tipperary**. **Superlative** is a bright cherry colored Swede with a small fine top and root of tankard shape, while **Tipperary** is a bright plum-colored type with a large top, globe-shaped root, and a very heavy yielder. **Tipperary** and **Elephant** are perhaps the two heaviest yielders, the latter being a dark purple tankard-shaped Swede. **Champion**, **Skirving's** and **Superlative**, are not quite such heavy yielders as **Tipperary** and **Elephant**. **Champion** is a very reliable sort, and is a very dark purple globe-shaped variety.

The most reliable varieties of Field Turnip are—**Imperial Green Globe**, **Purple Top Mammoth**, **Purple Top White Globe**, and **Purple Top Yellow Aberdeen**.

SOIL PREPARATION:—Follow thoroughly the instructions as given for Mangel and Sugar Mangel on page 48. Working up the land to a very fine tilth is very essential to secure successful germination of such fine seeds as Swede and Turnip.

FERTILISER:—As Swedes and Field Turnips mature much quicker than Mangels, and require Phosphoric Acid for their vigorous healthy development, **Superphosphate** at the rate of 112 lbs. per acre will usually be found the most suitable fertiliser. Farmyard manure, where available, should be used in conjunction with the Superphosphate.

SOWING THE SEED:—The best months for sowing Swedes are **December** and **January**, although seed may be sown from the middle of October onwards, and even as late as the beginning of March in some localities. **Field Turnips** may be sown from **October to December**.

From 2 to 3 lbs. of seed is required to sow an acre of either, the seed

SWEDE AND FIELD TURNIP (Continued).

being drilled in rows from 30 to 36 inches apart. After sowing, it is necessary to roll the ground so as to compact the soil around the seed.

SUBSEQUENT TREATMENT:—As soon as the seedlings are easily distinguishable in the rows, **scarify** to keep the soil loosened, and to keep down any weeds that may have sprung up. When the seedlings are about 3 inches high, **thin out** as recommended on page 49 for Mangel. The distances for both Swedes and Field Turnips at the **final thinning out** is 18 inches between the plants in the rows, this space being necessary to ensure the fullest development of the roots.

HARVESTING:—Swedes and Field Turnips may either be kept in the ground and eaten by sheep in the Winter when green stuff is scarce, or lifted as with Mangels, and stored. **Before feeding to cattle**, cut the roots into pieces, as the animals are apt to swallow the whole or irregular portions of the root, and are thus liable to be choked.

STORING:—Swedes and Field Turnips may be stored in good condition for about 8 to 10 weeks, but if kept for any greater length of time, the proportion of woody matter increases, thus rendering the roots unpalatable and less easily digested.

Swedes and Turnips have excellent feeding value owing to their succulency, bulk palatability, digestibility of the dry matter and the high percentage of sugar contained, and are valuable for fodder for sheep, pigs and cattle coming in and being available at a time when other food is scarce.

“VALUE,” NOT PRICE, IN BUYING SEEDS

Before buying Farm Seeds, whether Grasses, Clovers, Lucerne or Annual Fodders, every farmer should carefully consider the following four items:—

- (1) **Suitability for district, particularly as to kind and variety.**
- (2) **Freedom from and resistance to diseases.**
- (3) **Quality, i.e., Purity and Germination.**
- (4) **Strain.**

It is very probable that most growers consider the first before buying, but with regard to the others, it is certain that they are frequently overlooked. Progressive farmers, who recognise the importance of better and more profitable crop production, must realise, however, that the careful selection of seed under the points above enumerated is worthy of their attention.

These remarks are written with the purpose of encouraging farmers to buy and use the best seeds, both as regarding “quality” and “strain” as well as to convince them that there is no justification whatsoever for buying and sowing low priced seeds of inferior quality and doubtful strain and containing a high percentage of impurities, i.e., weed seeds and inert matter. “Strain” is dealt with very fully elsewhere in this booklet (see pages 8 and 33) and apart from this, the essential points to be carefully considered and borne in mind are:—

- (1) Seeds of some crops are unavoidably mixed with seeds of some undesirable weeds, which, when sown may gain the upper hand and reduce the stand of the main crop, consequently they will necessitate labor and expense in eradication to prevent permanent injury to the farm.
- (2) Old seed, which may have a low germination capacity, results in a poor crop, the field having throughout only scattered plants.
- (3) Seeds may have low germination capacity, due to—
 - (a) Unfavorable conditions during the development, harvesting, and storage of the seed; or
 - (b) Seed that has been kept too long, i.e., old age.
- (4) Seeds of certain crops, such as some Clovers, Grasses, etc., offered for sale usually come from overseas countries, which may have a vastly different climate to that under which they would be grown in this State, the ultimate results being reduction in yield of crop and carrying capacity of the pastures.

In the selection of seeds the following points should be looked for:—**Size, color, plumpness, brightness (and occasionally smell)**, but it is not always easy to judge by the eye. **Something more than good appearance is needed**, and that is **high percentage purity and germination**.

The “cheapness” of any seeds cannot be gauged by the actual price paid, it entirely depends on the value received for such price. This value is determined by (1) the strain, (2) the purity, i.e., how much actual seed is being received and how much inert matter and weed or other foreign seeds, and (3) what percentage of the pure seed received will germinate. Bear these essential factors carefully in mind when determining “value.”

In conclusion, the following points should be given careful consideration:—

Buy on tested samples and obtain a statement as to the percentage of purity and germination, which will tell what proportion of the bulk of the seed is true to name; note the nature of the impurities and especially the amount of weed seeds present. The germination will show the percentage of pure seeds which are capable of growth.

Avoid low-priced seeds unless there is definite proof to show they are good, as low prices and inferiority generally go together.

RAPE

(*Brassica napus*)

Rape is a native of temperate Europe, and is valuable as a fodder plant, for green manuring and for oil. Like other Brassicas, it is best adapted to a cool growing season, and for a heavy yield, rich, moist soil is required. Rape may be regarded as practically an **"all-the-year-round" fodder**. It is very hardy and withstands the Winter well, and although the best results are obtained from Autumn and early Winter sowings, still, seedings may be also made from the beginning of August to as late as the end of October, and good yields secured. Rape, therefore, may also be classed as a Summer fodder.

UTILITY:—Rape is simple of culture, makes a strong, rapid growth, adapts itself readily to various soils and climatic conditions, responds readily to fertiliser and good cultivation and, most important of all its useful qualities, it is a palatable, wholesome and nutritious green food for fattening sheep or pigs, for grazing horses or for bringing cattle to prime condition for marketing. **It is principally used for green forage**, hardly ever being cured for hay, and is a **most essential and valuable adjunct to the export trade in fat lambs**.

In feeding value Rape is about equal to Lucerne, and being quickly grown, it is always likely to maintain its place for Summer forage where climatic conditions are suitable, even where the "King of Fodders" can be successfully grown. The carrying capacity of Rape will be appreciated when it is realised that from **10 to 30 sheep can be fattened per acre**, according to the size of the crop. Rape is also valuable as a soiling crop.



A field of Brunning's Broadleaf Dwarf Essex Rape.

SOILS AND PREPARATION OF LAND:—Rape **does best** on very loamy ground of good quality, and on sandy soil well manured; low-lying heavy clay or badly-drained soil is most unsuitable, and where deficient in this element, the ground is much improved by a heavy dressing of lime. An Autumn and Winter fallow for Spring sowing, or a Summer fallow for Autumn seeding very much improves the land, and as the seed is small and requires a fine seed bed, soil preparation must in all cases be thorough. **Proper drainage is also most necessary** to success.

SOWING THE SEED:—Rape **must be sown shallow** to obtain good germination, **half an inch** being deep enough, and even in very loose soils the limit depth is $\frac{3}{4}$ inch. Bear in mind that the heavier and stiffer the soil, the shallower the seeding. Rape is generally **sown broadcast**, in which case **4 lbs. seed per acre** is sufficient.

The best method of broadcasting Rape is with a Cahoon Hand Sower, which sows the necessary quantity accurately. Scatter the seed on the surface with the Cahoon Sower, then brush harrow and finish off with a plain heavy roller to compact the soil around the seed. **Too dense seeding causes crowding** of the plants and smaller growth, and the quantity recommended should not on any account be exceeded.

Rape is also sown in rows with a grain drill and cultivated, the width between the rows generally varying from 24 to 36 inches apart; when seeded in drills, from $1\frac{1}{2}$ to $2\frac{1}{2}$ lbs. of seed per acre is required according to the distance apart. When planted in close rows, say 7 inches apart, with a grain drill, from $2\frac{1}{2}$ to 3 lbs. seed will be needed to sow an acre, but there is no advantage in this method, over broadcasting.

When Rape is grown in wide drills, **cultivation should be thorough**, a light horse-scarifier being worked between the rows to keep the surface soil loose and to destroy any weeds that may have sprung up. Two or three scarifyings will be all that is necessary on fairly clean land as the plants soon develop, when the broad leaves will smother the weeds. This cultivation, which is especially essential when growing Rape for Summer Fodder in arid districts, will also **help to conserve** the soil moisture—so important in the successful growing of Summer Fodder crops.

RAPE (Continued).

TIME OF SOWING:—Rape is most extensively used as a Winter or early Spring forage, in which case it is sown in the Autumn or early Winter, after the first rains in March up to the middle of June; but as a Summer fodder, sow from beginning of August to end of October, the period of seeding being limited according to the season. For drier districts, the earlier sowing is necessary.

PASTURING:—Allow Rape to get well up, say, about 12 or 18 inches high before feeding off, but put the stock in before the flowering stage, when the crop can be eaten down fairly close, after which there must be a spell to enable fresh growth to take place. A Grass and Clover paddock to which stock may have access at the same time as they are running on the Rape is of great advantage, as it helps to provide a balanced ration whilst spelling the Rape.

Do not put stock on to well-grown Rape whilst hungry as they are liable to get blown; **the best method is** to run them through the Rape when the dew is off and the sun has been on the crop a few hours. If only allowed 10 or 15 minutes the first day, a little longer the second, gradually increasing the time, they will be found to suffer very little, although some cases are liable to occur at all times.

Rape is usually utilised for pasturing sheep and pigs, although cattle and horses eat it readily, but destroy a considerable portion by trampling, and therefore where intended for this purpose, sow the Rape in rows, which tends to minimise the loss. Cattle feeding on Rape will consume a larger amount of salt than usual, and this must be freely supplied as it seems to prevent the purging effect which Rape often produces. **Care must also be taken to prevent bloat.**

FOR GREEN MANURING:—Rape is a valuable crop for improving the land, and ploughed in for green manure leaves the soil in much better condition for succeeding crops. Though not a legume, it deposits a quantity of nitrogen and phosphoric acid, a fair supply of potash, and a large amount of humus in the shape of decaying matter. **Autumn-sown Rape is best** for soiling, pasturing through the Winter and ploughing under in early Spring when about 10 inches high.

RAPE AND MUSTARD:—Sheep and cattle fed solely on Rape are liable to scour. To counteract this trouble, sow from $\frac{1}{2}$ lb. to $\frac{3}{4}$ lb. White Mustard per acre in mixture with Rape. This mixture is more extensively used than the Rape alone, especially when it is intended to plough the crop under, as White Mustard is equally as valuable as Rape for green manuring purposes.

SEED SELECTION:—It is essential that the right type of Rape seed be sown. There are several types, but the only strain suitable for fodder purposes is the true Broadleaved Dwarf Essex which comes from either England or Holland. Be careful not to purchase French, German, Polish or Japanese Rape seed for sowing down purposes. The safe plan is to buy only Brunning's Genuine Dwarf Essex Rape, either Holland or English grown seed. These strains are of about equal value.

Giant Kangaroo Rape is a stronger growing type, yielding (it is said) a much larger bulk of fodder. Excellent results have been obtained from sowing Brunning's Giant Kangaroo Rape Seed.

The Best Seeds are the Cheapest. Make your purchases from a reputable house. Brunning's Seeds are reliable in every respect. See also page 51.

THOUSAND HEADED KALE (Russell's Improved Strain)

Thousand Headed Kale is closely related to both Rape and Chou Moellier and is an excellent grazing crop for fattening sheep, cattle, pigs and horses, while as a milk producer it is especially valuable. Like Chou Moellier, it is suited to only temperate climates and is not suitable for growing in hot, dry localities, even where irrigation is available. It is an excellent crop for sowing to follow on after Rape for Winter feed and is slower in developing than the latter. It does not cause bloat or scour and is quite safe to pasture at all times.

SOIL PREPARATION AND SEED SOWING:—Follow the directions for Dwarf Essex Rape (see page 52) in preparing the ground, but sow the seed in drills from 30 to 36 inches apart. In this way, 2 lbs. of seed will be found ample for an acre. If the seedlings come up too thickly in the rows, thin out when about 3 inches high to from 27 to 30 inches apart in the rows. Seed may be sown in January and February, and again in May, June and July.

SUBSEQUENT TREATMENT:—As soon as the plants are a few inches high, scarify between the rows to check the weeds and subsequently cultivate until the plants begin to touch each other in the rows, after which no further attention is necessary. The crop may be cut or grazed, and being a heavy yielder, can be cut several times as the plants will sprout again immediately and give another good yield in a very short period. When grazing, it is unnecessary to even water sheep or lambs when put on Kale during the fattening process of six or eight weeks. For topping off this crop cannot be excelled and there is no danger of either bloat or scouring. It is necessary to sow the right strain, the Russell's Improved Stock, for the maximum results. See also notes on Chou Moellier, page 54.

CHOU MOELLIER

(Marrow-stemmed Tree Kale)

Chou Moellier is a member of the Kale family, of very high carrying capacity, especially valuable for growing for dairy cows, being **unsurpassed as a milk producer**, and in addition being quite **free from any danger of taint**. The herbage is **harmless as regards bloat or scouring** and both high in palatability and nutrition. The plants attain a height of from 5 to 6 feet, carrying a main stalk which has a sweet and juicy pith or marrow, hence the vernacular name. This main stalk is solid and from 5 to 6 inches in diameter. There are two species, the **White or Green Stemmed** and the **Purple**, both of equal merit and only differing in the color of the stem.

GENERAL REQUIREMENTS:—The climatic requirements, soil conditions and method of preparing the ground is the same as for Dwarf Essex Rape (See page 52). Chou Moellier is sown thinly in rows **24 inches apart** and from **1½ to 2 lbs. of seed** is ample to adequately cover an acre. A good method is to take every second hose from the seed drill and to sow 112 lbs. of Superphosphate with the seed. Seed may be sown from the first Autumn rains in **March or April right through to October**, but generally the **best results** will be obtained from sowing in April, May or early June.



Chou Moellier, or Marrow Stemmed Tree Kale.

SUBSEQUENT TREATMENT:—Where the seed has been sown too thickly it will be necessary to thin out the plants to allow of their proper development. This can be done when the seedlings are about 3 inches high, **spacing out from 14 to 15 inches** between each plant in the row. No further treatment is necessary except a possible cultivation or two to keep down the weeds, but the plants grow quickly and soon cover the intervening spaces, thus smothering any weeds that may appear later.

As the plants grow, **cut the leaves** once a fortnight, **being careful to cut** and not to pull. **Pulling destroys** the new shoots, and thereby shortens the period of usefulness of the crop. By the time the leaf supply has been exhausted, the stems will be thoroughly developed and can be chaffed together with the remaining top leaves. Chou Moellier when established is fairly resistant to dry weather, economical in management, immune to disease, does not cause taint or bloat and can be eaten down to the last shred of the highly sugared stalks. When the green crop is finished with, the strong root system can be ploughed under and will improve the texture of the soil by supplying needed humus.

COMPARISON WITH KALE:—Chou Moellier is grown for the thick stem and the leaves, which give the **maximum results when cut** and fed green, but it may also be pastured with very satisfactory results. **Thousand Headed Kale** on the other hand is a branching plant, throwing out a number of broad leaves from a thin stem in somewhat the same manner as Rape and is **more suitable for grazing** than for cutting.

Both plants may be pastured without any fear of ill effects from **bloat**, and in this respect can be preferred to Dwarf Essex Rape. Neither are liable to **taint milk**, and in this respect alone are extremely valuable.

ESTABLISHING AND MAINTAINING LUCERNE

The wide range of utility of Lucerne makes it easy to understand why this valuable perennial is one of the most largely grown fodder plants of Australia. Under reasonably suitable conditions, Lucerne is most highly productive and can be cut for green feed, makes an excellent pasture plant if grazed judiciously, is highly valuable for converting into ensilage and is one of the best hay plants grown.

The greatest value of Lucerne is indeed in the hay, which is of the highest quality, of greater digestibility than most forms of rough food, extremely nutritious, and what is also very important, easily cured.

Lucerne belongs to the Medicago family, which also includes English Trefoil or Black Medick and the Native Trefoils such as Medicago Maculata and Medicago Denticulata, better known as Burr Clovers. As a legume, it is a nitrogen gatherer and a soil improver, and even when laid down only temporarily for three or four years, leaves the land in better condition than when it was originally laid down. This is an additional benefit to the pasture and hay yielded during that period.

CLIMATIC ADAPTABILITY:—Lucerne has now been successfully established and proven in every State in Australia and its wide climatic adaptability is chiefly limited by suitable soil conditions, as apart from some of the colder parts of the Commonwealth, there is practically no district where it cannot be grown on at least a payable basis on account of climatic unsuitability.



Cows grazing on Lucerne at Dookie Agricultural College. By courtesy Commonwealth Fertilisers and Chemicals Ltd.

VARIOUS TYPES:—There are many varying species or strains of Lucerne, but those of commercial value in Australia may be limited to the Australian Hunter River and New Zealand Marlborough types, both of which were originally propagated from the French Provence strain.

New types of Lucerne said to possess many great virtues are offered from time to time, and without commenting on their desirability or otherwise, it may be safely assumed that for more than 95 per cent. of Australian requirements, the two types previously referred to, will prove quite equal, if not much better, with the added advantage of knowing that the Australian Hunter River and the New Zealand Marlborough Lucernes have been definitely proved for yield, suitability, etc., under such conditions.

ESSENTIALS TO SUCCESS:—The essentials for growing a successful and profitable stand of Lucerne may be briefly summarised as follows:—

1. Thorough sub-soiling.
2. Proper and complete soil preparation.
3. The use of Lime when preparing the ground.
4. Adequate manuring in the shape of top-dressing.
5. Well and thoroughly drained land.
6. Frequent cultivation.
7. Efficient grading.
8. Effective watering (where grown under irrigation).

And last but not least:—

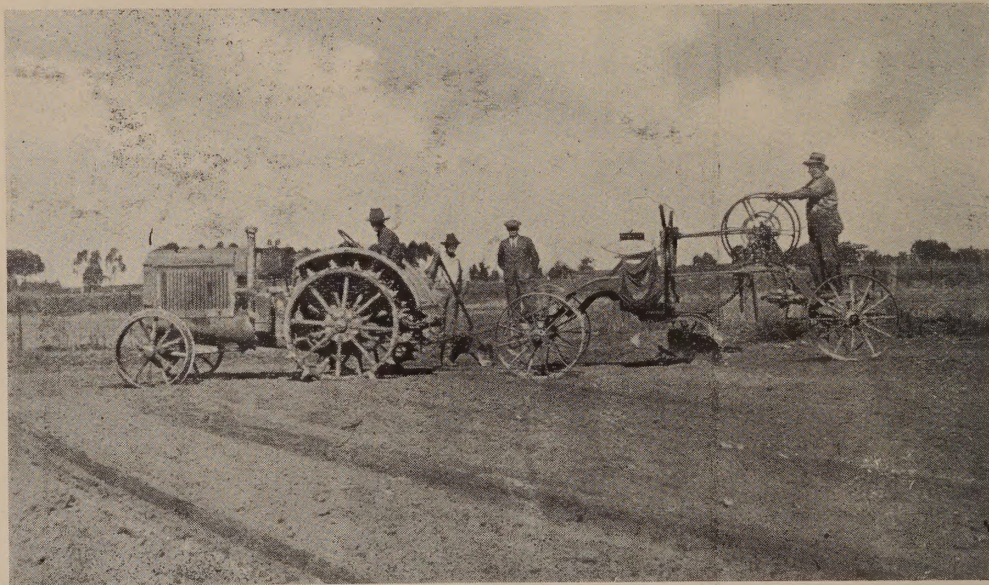
9. The sowing of reliable, healthy, vigorous, machine-dressed seed, free from dodder and other noxious weeds.

SUB-SOILING:—Lucerne being a deep-rooting plant, reasonably deep land is necessary to establish a payable and permanent stand. Although the roots have great penetrating power, it is necessary that they be enabled to get down to the low strata of earth by a deep stirring up of the stiff sub-soil. On true river flat Lucerne land, such as experienced in many parts of New South Wales, such thorough sub-soiling should not be necessary, but in ordinary Lucerne Country, this operation is most essential, as, if the plant cannot send its roots down into the lower soil strata, it is unable to withstand drought and to persist as a true permanent pasture.

Lack of sub-soiling or neglect to break up the lower strata of ground prevents the roots from penetrating right down and forces them to run along the surface soil, thus impoverishing the plant by depriving it of the foods contained in the sub-soil, and at the same time rendering it liable to be burnt out in dry, hot weather.

LIME:—As one of the necessary plant food constituents, **Lime is essential in any land** from which a good crop of Lucerne is to be expected. Lime also tends to liberate from its insoluble form of combinations another essential plant food substance in Potash, and, at the same time, converts it into a condition in which it is readily available to the plant as food; it is also essential to the development of the micro-organisms which bring about the formation of nitrates in soils, and in addition, it is necessary to neutralise the acids that are naturally formed in the process of decay of the organic matter present in soils.

MANURE:—Fertiliser may be applied at the time of preparing the ground, but at least four weeks after applying Lime, or mixed with the seed and the two sown together at the one operation. As a rule, Superphosphate at the rate of 112 lbs. to 140 lbs. per acre will be found the most effective. Australian soils being more deficient in Phosphorus than in the two other essential elements, Nitrogen and Potash, the Superphosphate supplies the necessary balance. These remarks apply only to Manure at time of sowing the seed, but top-dressing an established stand will also be found a remunerative and profitable investment. This will be dealt with later on. See page 61.



Making check banks on Lucerne Land in the Murrumbidgee Irrigation Area. By courtesy Commonwealth Fertilisers and Chemicals Ltd.

Don't be mislead by description. Insist on Brunning's "Standard" A.1. Hunter River Lucerne seed.

SOIL PREPARATION:—After sub-soiling, it is necessary to make a good seed bed, because Lucerne is a small seed, and unless the land is properly worked up for sowing, a large quantity of seed is liable to be buried, and a patchy stand will result.

To prepare the ground, plough as deeply as possible without bringing clay to the surface, and follow in the furrow with a sub-soiling plough, set from 12 to 14 inches deep. This depth of loose soil will enable the young plants to root well, and where irrigation is practised, will enable the applied water to soak down. Bacterial action, so essential to the healthy growth of Lucerne, takes place chiefly within from 12 to 24 inches below the surface, hence the necessity for having this layer of the soil in good physical condition. Just before the seed is sown, plough the land again, then harrow and roll.

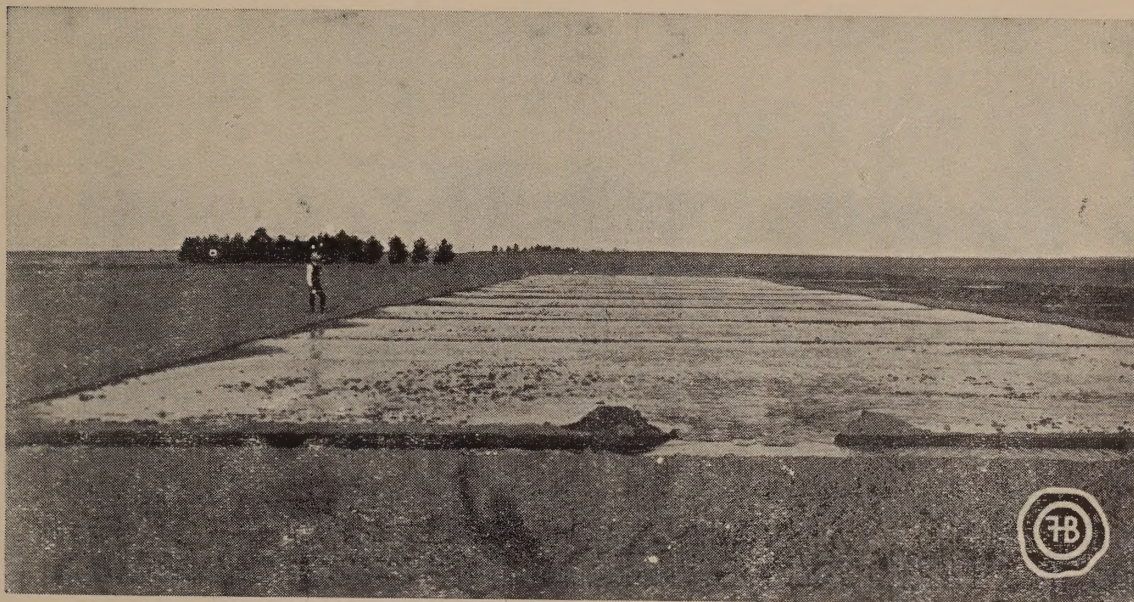
A firm, fine seed bed is essential, and to bring the soil to the requisite fine tilth, it may be necessary to roll twice. When broadcasting the seed, run a pair of harrows lightly over the compacted soil just prior to seeding. If weeds or grass are still present, they should be worked out with a spring-tooth cultivator, and removed. The ground will then be ready for sowing the seed.

DRAINAGE:—Thorough and adequate drainage is absolutely necessary, and if the soil is not naturally drained to a depth of at least several feet, this deficiency must be attended to before Lucerne growing is attempted. Where badly drained patches occur in a field, it will be noticed that the Lucerne soon dies out, and is replaced by weeds. The plants are not affected by flood water, unless submerged for some time, but water must never be allowed to lie on Lucerne for any length of time, and to cover a field for two or three days will surely mean killing it out. Lucerne will not stand "wet feet."

LUCERNE (Continued).

GRADING:—At this stage a word on the subject of grading where Lucerne is grown under irrigation will not be out of place. **Efficient and correct grading is most necessary** to ensure an even and uniform watering of the crop, and to prevent the moisture collecting in depressions and thereby killing out the Lucerne, with the result that the stand becomes patchy. Bad drainage is even more harmful to Lucerne than lack of moisture, or the worst weather conditions.

WHEN TO SOW:—Lucerne seed may be sown both in the Spring and the Autumn, according to the rainfall, the climatic conditions, and whether irrigation is available or not. Where irrigation is not available, **Autumn sowing is the best** for hot, dry districts with a light Summer rainfall and a mild Winter. **Where facilities for artificial watering are available, under such climatic conditions, seeding may be carried out either in the Autumn or Spring**, although the latter is, if anything, preferable, as with the advent of warm weather, the young Lucerne plants grow rapidly and soon out-distance any weeds that may have survived the preparatory cultivation of the ground.



Efficient Grading ensures Uniform Watering.

Brunning's "STANDARD" A.1. Hunter River Lucerne represents superiority in Quality. Do not confuse with other lower grades.

For districts such as Gippsland, with a colder Winter and more regular Summer rainfall, Spring sowing will generally give the best results, but it does not necessarily follow that this rule is invariable, and splendid stands have been secured both there and in other cooler parts of Victoria from early Autumn seedings. Autumn sowings must be carried out early in these districts, to allow the young plants to become thoroughly established before being called on to withstand cold weather, and where circumstances necessitate late seeding, from 20 lbs. to 30 lbs. per acre of Algerian Oats as a nurse crop will help to protect the young plants, although, except under a few special conditions, such as the preceding, it is better to sow Lucerne without a nurse crop.

On the other hand, while Spring seeding is preferable in the Northern areas of Victoria where irrigation is available, **seed sown in the Autumn enables the plants to become thoroughly established during the Winter and early Spring, before being called on to withstand the dry Summer weather, and, to a great degree, economises in the number of irrigations necessary. Another advantage is that an Autumn sown crop in these districts can be utilised to a considerable extent during the first Summer, while Lucerne sown the previous Spring must be treated lightly until more thoroughly established.**

GOOD SEED ESSENTIAL:—Apart from the strain, it is essential that Lucerne seed not only possess a high percentage of purity and germination, but that any impurities do not include Dodder and other noxious weeds. For that reason, it is desirable to purchase seed which has been efficiently machine-dressed by a reputable seed house. See page 61 for further information regarding Dodder.

LUCERNE (Continued).

BRUNNING'S SEED BEST:—In the first place, **Brunning's Lucerne seed is saved** only from healthy, vigorous crops growing in paddocks free from dodder and reasonably clean as regards other weeds; **secondly**, after arrival into the store it is **dressed** by means of **efficient** and up-to-date **machinery** to ensure the elimination of noxious weed seeds, inert matter, etc.

Brunning's "**STANDARD A.1.**" quality Hunter River Lucerne means seed that is heavily and efficiently triple dressed to a set grade and is as near perfection in the plumpness of grain, the germination and the purity as possible. It represents the "**acme of perfection**" in Lucerne seed and is unsurpassable, being **practically 100 per cent. pure** and growing from 97 per cent. to 98 per cent., including hard seeds.

To ensure purchasers getting "**Standard A.1.**" when they do not purchase direct from head office, this seed is only supplied in sealed white calico bags, each containing 28 lbs. nett weight of seed, except when an odd quantity is required, and then it is packed accordingly. This "**Standard A.1.**" Lucerne is never sent out except under seal, so that clients should **watch that the seal is unbroken** when the seed is received by them and if so, report immediately to **Box 857, Melbourne**, so that an investigation can be made.



Second Year Lucerne at Cobram. 15 lbs. seed and $1\frac{1}{2}$ cwts. Superphosphate per acre were sown in July, 1932. A top-dressing of $1\frac{1}{2}$ cwts. Superphosphate per acre was applied in 1933; this cut was taken in December, 1933— $2\frac{1}{2}$ tons per acre. By courtesy Commonwealth Fertilisers and Chemicals Ltd.

See pages 64, 65 for full details of the splendid Subterranean Clover/Wimmera Ryegrass association. Government "Certified" seed of the Extra Early Dwalganup strain of Subterranean Clover is available for the first time in 1935. Sow "Certified" seeds for results.

Brunning's second quality of Hunter River Lucerne seed is termed "**Supergrade**" and is seed that has been **heavily double dressed**. "Supergrade" is quite equal to and in many cases **superior to the best** sent out by most other houses, and is a particularly choice grade which can be sown with every confidence.

Brunning's "**Prime**" Hunter River Lucerne seed is a really good **once heavily machine-dressed** seed and is good sterling value, although not equal in this respect to "Standard A.1." or "Supergrade."

In addition, **to meet competition**, Brunnings can supply ordinary Farmer's Dressed Hunter River Lucerne of varying qualities and will be glad to submit samples to those who do not require such a high quality as "Standard A.1.," "Supergrade" or "Prime."

QUANTITY TO SOW:—The quantity of Lucerne seed to sow **per acre is determined by two factors, viz., "Quality" and "Method of Sowing."** When seed is sown in the usual manner in 7 inch rows, less will be required than when broadcasting and likewise, the higher the purity and germination (i.e., quality), **the smaller the amount** of seed required to adequately cover any given area.

Brunnings cater for **three regular grades** (apart from lines of ordinary farmer's winnowed seed) and these are described as "**Standard A1.**" "**Supergrade**" and "**Prime.**" All three are machine-dressed and of reliable quality. The following will be found sufficient per acre:—

STANDARD A1.	Drills, 7 to 8 lbs.	Broadcasted 11 to 12 lbs.
SUPERGRADE.	Drills, 9 to 10 lbs.	Broadcasted 15 to 16 lbs.
PRIME.	Drills, 12 to 14 lbs.	Broadcasted 20 lbs.

The preceding may be regarded as maximums rather than minimums and experienced Lucerne growers will probably be able to do with less. Some years ago, several acres were sown at Werribee with "Standard A1" at the rate of $2\frac{1}{2}$ lbs. per acre and an excellent stand obtained.

LUCERNE (Continued).

HOW TO SOW:—Lucerne seed may be sown both broadcast and in rows. Broadcast sowing enables the plants to cover the ground evenly and gives the weeds a lesser opportunity of obtaining a foothold, and for many reasons is preferable to drilling; but, of course, more seed is required per acre than when sown in rows. The **most economical method of broadcasting** Lucerne is with a **Cahoon Hand Seed Sower**, which will broadcast evenly any desired quantity of seed at the rate of from 4 to 5 acres per hour.

Where desired to save unnecessary operation, **seed and manure may be sown together**, whether drilling or broadcasting. The seed and manure **should be mixed immediately prior to sowing**, and **on no account allowed to remain standing mixed** for any lengthy period, otherwise the Superphosphate is liable to burn the seed, and thus impair its germinating powers. From $1\frac{1}{2}$ to 2 hours is a reasonably safe limit, but the latter time **cannot be exceeded** with safety.

Broadcast sowing precludes the possibility of cultivation, and is only feasible where irrigation is available or in districts with a good Summer rainfall, and except in very dry districts and without irrigation, seed is now more uniformly sown in **rows about 7 inches apart**, using a seed drill. By this method less seed is necessary per acre and cultivation may be more easily practised.



Lucerne successfully established on Mr. C. Botteril's property, "Werawai" Trawool, near Seymour. Sown October, 1933, and first cut taken January, 1934. By courtesy Commonwealth Fertilisers and Chemicals Ltd.

Deep seeding is not conducive to good results, and care must be taken when drilling Lucerne seed to see that it is **not planted too deeply**, as even if only covered very lightly, it must lie in a furrow, and beating rain may wash the ground over it, burying it to a greater depth. It is, therefore, always necessary to **be careful to sow shallow when drilling**. After seeding has been completed, whether broadcasting or drilling, it is **necessary to roll** to compact the soil around the seed, and **THIS ROLLING AFTER SEEDING IS ESSENTIAL TO SECURING A GOOD STRIKE**.

TREATMENT AFTER SOWING:—After the seed has been sown, the weeds must be kept in check, and while a light harrowing might be of advantage, it is always risky at this stage and must not be attempted until the Lucerne roots have obtained a fairly firm hold. **The best method of checking early weeds**, which compete with Lucerne, **is to mow frequently**, putting the mower over the crop before any of the weeds have commenced to seed, and if necessary, repeating the operation about a month afterwards.

Make the first cut before the Lucerne has reached the flowering stage, as in addition to keeping down the weeds, **early cutting** helps to establish the roots and to **make the plants stool out**. The first cutting makes excellent hay or can be used for green feed as required. Do not mow too close to the ground at any time, but always leave a few leaves. After the second cutting has been taken, particularly on ground which sets hard, the harrow can be used. **Do not pasture** Lucerne during these early stages of growth.

LUCERNE (Continued).

CARE OF ESTABLISHED STAND:—When thoroughly established **Lucerne** thrives on very frequent cultivation and from the time the plants are two years old and onwards, cultivation can be carried out very freely, using a disc harrow with the discs set rather straight and the harrows weighed to cause them to sink to the right depth. This cultivation is valuable in conserving moisture, as the loosening of the surface allows the water or rain to percolate to a greater depth and prevents waste by running over the surface, as well as minimising loss through possible evaporation.

Cultivation also thickens the crop, as the splitting of the crowns by the disc harrow encourages stooling, and no fear need be entertained that the operation at this stage will injure the plants, as they are too strongly rooted to be harmed by surface cultivation. Where a disc harrow is not available an ordinary spring-tooth cultivator can be used just as effectively, and for moist ground one fitted with special narrow tines is most satisfactory.

In districts where irrigation facilities are available, it is a good practice after feeding down the Lucerne and giving it an irrigation to broadcast a bushel of Algerian Oats per acre in the crop. A deep scarifying will suffice



Cutting a Good Stand of Brunning's Lucerne.

Brunning's "STANDARD" A.1. Hunter River Lucerne is the BEST both in "Quality" and "Value."

to cover the Oats, which will grow up with the Lucerne, thus providing an abundance of useful fodder during the Winter, when the latter is dormant, while if the stock are removed from the field in September and the crop permitted to mature, the Oats can be cut for hay and make a valuable reserve of fodder for any kind of stock. The best time for sowing the Oats is in the early Autumn. After cutting the oaten hay, irrigate the ground and scarify again. The cultivation and the Oats help the Lucerne, while the Oats grow more freely, owing to the fertilising qualities of the latter.

In the second and subsequent harvest years, Lucerne is usually cut two, three or even four times, for hay or for green feed, but **frequent cutting has the effect** of diminishing the persistency of the stand, and even under the most favorable conditions, more than three cuts will tend in this direction; while under conditions less suited to Lucerne cultivation, it is not advisable to cut more than twice each season if it is desired to maintain a long duration stand.

CUTTING FOR HAY:—The time to cut Lucerne for hay is just when it is coming into bloom, that is to say, not more than 10 per cent. of the crop should be in flower, and as at this stage the second growth is commencing to show, it is obviously unwise to destroy the basis of the succeeding crop. Experienced growers prefer to judge the time to mow their Lucerne by the height of the second growth, which should not be more than an inch or two.

The **first cutting** of the season should take place **before flowering** has commenced. In warm, dry climates, cut, rake and put the Lucerne into stooks all in the same day, allowing it to remain in the stook for one day only (unless wet weather sets in) before proceeding with the stacking. Drying is a very rapid process in warm, dry climates, and delay will inevitably result in loss of the succulent leaves, and as the valuable part of Lucerne is its leaf, care must be taken in all haymaking operations to conserve the foliage. In moister climates, curing will, of course, take longer, and allowance must be made accordingly. Stack the Lucerne under cover as the quality of the hay is thereby improved.

LUCERNE (Continued).

DODDER:—This noxious scourge is the greatest enemy of Lucerne, and although the use of **Brunning's Specially Clean Dodder-Free Seed** will to a great extent keep it out of the Lucerne paddocks, there is always the danger, with Dodder, that it may have been allowed to seed.

Seed of Dodder retains its germinating powers for several years, and has been known to lie dormant in the ground for a lengthy period, so that it appears in the crop although not actually present in the seed sown. This is a very important point, and again emphasises the necessity for using only properly cleaned, reliable seed. The Dodder in the earlier stages of growth appears similar to a thread-like vine, and the young plants attach themselves to the Lucerne seedlings. As soon as this thread-like vine is firmly attached to the Lucerne Plant, the stem connecting it with the ground withers away and the Dodder draws its sustenance from the Lucerne by means of tiny suckers which enter the tissues of the host plant. Dodder grows very rapidly, forming tangled masses with its yellow stems, and soon chokes out the Lucerne. The flowers are of a bright golden yellow. **As soon as there is any suspicion of Dodder appearing in a Lucerne or Clover field, send us samples of the plants and we will be glad to identify and recommend remedies for its eradication.** On no account allow the Dodder to seed as this only prolongs and spreads the trouble.



A Successful Stand of Brunning's Hunter River Lucerne at Kerang.
The Best Seed is the Cheapest.

BENEFITS OF TOP-DRESSING:—It has now been definitely and conclusively proved that the following benefits are derived from top-dressing established Lucerne pastures with Superphosphate.

- (a) The yield of Lucerne is increased.
- (b) Old established stands are rejuvenated.
- (c) The more vigorous growth enables the Lucerne to smother the undergrowth of weeds.
- (d) The feeding value of both the green fodder and the hay is much improved, thereby benefiting the health of stock.
- (e) The growing period is extended, making feed available in the late Autumn and early Winter, when it is most valuable.
- (f) The life of the pasture is undoubtedly prolonged.

The amount of Superphosphate to be applied **should not be less than 112 lbs. per acre**, but even as much as 448 lbs. per acre may be used with correspondingly increased benefits from the extra outlay. Remember, **you can only take out of the soil what you put into it**, and that the increased yields from top-dressings well repay any expenditure incurred thereby.

In Northern Victoria and similar climates where Lucerne is grown under irrigation, from the **middle of July to the end of August** will be found the most suitable period, but in districts such as Gippsland, where natural rainfall is relied on, **September** will be found a more suitable month. The point to bear in mind is that the most payable time to top-dress is just before the advent of milder weather in the early Spring starts the crop into growth. Some successful Lucerne growers use from three to four cwt. per acre under irrigation, **making the first application of about 168 lbs. per acre in July, the next of 168 lbs. per acre a month later, finishing up with a final application of 112 lbs. per acre late in September or early October.**

POA AQUATICA

(Water Meadow Grass)

Poa Aquatica is a perennial plant suitable for wet, swampy land and growing to a height of about 6 feet. As the seed is generally infertile, the only sure means of **propagation** is by means of the **roots**. It furnishes nutritious, palatable fodder, especially for dairy cows, and being a true Poa (same family as Kentucky Blue Grass) has no deleterious qualities like the Reed Grasses, **nor is it dangerous** in any way like the Sorghum family.

UTILITY:—The principal feature is that Poa Aquatica provides palatable and nutritious fodder **under conditions** where other Pasture plants **cannot be grown**. In addition, it (1) reclaims swamps by suppressing sedges and rushes, (2) obliterates dangerous bogs and makes the swamp surface safe for stock, (3) converts undrainable swamps and other useless land into valuable pasture, and (4) yields an enormous bulk of succulent fodder (resembling Japanese Millet) with excellent fattening properties, palatable to all kinds of stock and especially suitable for dairy cows.

SOIL NEEDS:—Poa Aquatica is a moisture loving plant, requiring wet, swampy land. **Drainage is quite unnecessary** and **no preparation of the ground is required**, either before or after planting out.



Poa Aquatica.

"Value" not "Price" when buying Seeds. See page 51.

HOW TO PLANT:—The grass is propagated from the roots of which **two (2) bags** are required to plant out **an acre**. This quantity will suffice by planting sets here and there in or on the margin of swamps; for quicker results, plant **up to five (5) bags per acre** in mud or in shallow water, allowing the leaves of the plants to project above the surface.

In dense ti-tree swamps, the **scrub should be slashed** and burnt before planting, although in rather open ti-tree swamps, the grass can be established without these preliminary operations. Slashing and burning is however, recommended wherever possible, especially as Poa Aquatica has such a **strong retarding effect** on a young growth of ti-tree. The roots soon start and make rapid growth, inwards and outwards, into the water to a depth of 2 feet, running many yards in a very short space of time. The growth is also extraordinarily rapid in wet, sandy soil, and Poa Aquatica is easily established along the low banks of streams or waterholes.

Under such conditions, Poa Aquatica grows particularly well in **association with Lotus Major** (Greater Birdfoot Trefoil), and thus makes an excellently well-balanced Grass and Clover pasture.

GENERAL:—Poa Aquatica is **unharmful by floods** as its upright growth preserves the grass from silt, and this natural form of top-dressing is really a benefit rather than otherwise. Owing to its habit of growth, the plants are **improved by trampling** and close feeding, and the harder it is grazed (when once established), the better. Poa Aquatica can **never become a nuisance** by spreading into cultivated land, as away from its naturally moist habitat, it will not thrive, although if established it **will persist** year after year in swamps, which may dry out on the surface during the Summer months. On this account, it is an **excellent stand-by** during dry weather.

Finally, it may be stated that Poa Aquatica **does not supersede "Tarwei" Strawberry Clover** or Lotus Major, but has a niche of usefulness all its own, and which, in many instances, cannot be filled by the two Clovers mentioned.

"MESGAWI" BERSEEM CLOVER

The Winter Lucerne.

Brunning's "Mesgawi" Berseem Clover is a valuable and useful annual Winter and Spring fodder, first introduced from Egypt about sixteen years ago; since then it has achieved considerable popularity in Australia, having been successfully grown in Western Australia, South Australia, Tasmania, New South Wales and many parts of Victoria.

UTILITY:—Brunning's "Mesgawi" Berseem Clover can be used for **pasture, cut for green feed, or ploughed under as green manure** to improve the soil, and is particularly valuable in the latter respect, especially as a predecessor to Lucerne. It is an **excellent crop for cleaning land** as the frequent cuttings destroy weeds, and although it is a good pasture plant, much better results are obtained by cutting and feeding green, stock being liable to trample down and damage the plants while grazing, thus materially injuring the prospects of succeeding growths. Although Berseem is not recommended for the purpose, it yields a hay of very fair quality. **It does not taint milk or butter** when used as green fodder; and although it is of course necessary to take the usual common precautions against blowing, no cases of bloat due to "Mesgawi" Berseem Clover are on record. For the sake of safety, however, it is always advisable to give stock a feed of chaff or hay before putting them in on a Berseem paddock, especially when it is wet with rain or dew.

WHEN TO SOW:—To secure the maximum results, **early sowing and thick seeding** is necessary. Where conditions permit, **sow in February**, but certainly not later than the end of March, although in warmer districts with a mild Winter climate seeding may be carried out with success as late as the end of April. It will easily be understood, however, that an annual completing its life in one season, **cannot be expected** to yield as heavily from late as from early sowings as the period of growth is much shorter when sown late than when seeded early.

Modern Grass philosophy can be summed up in four words—**Species, Strain, Fertility and Management.** It is along these lines that Mr. W. Davies, the well-known agrostologist, considers grassland experiments must be conducted.

SOIL REQUIREMENTS:—Berseem is adaptable as regards soil, and successful results may be expected from any land that will grow Lucerne well **providing there is plenty of lime in the ground.** Where this element is lacking, a good heavy liming is necessary before proceeding with the soil preparation. **Good drainage is essential** and the ground must be thoroughly broken up and pulverised so that there is no hardpan or impervious subsoil to check the growth of the plant.

Bone Dust and Superphosphate mixed, used at the rate of from **112 lbs. to 168 lbs. per acre,** according to the state of the soil, will be found the most suitable fertiliser. Superphosphate alone will give the results as far as the Berseem alone is concerned, but the value of the Bone Dust will be evident with the succeeding crop.

On no account attempt to grow Berseem without proper soil preparation, but follow the **same method** as you would in preparing the ground for Lucerne, that is, provide a **properly prepared seed bed** thoroughly worked and brought to a fine tilth.

METHOD OF SEEDING:—Berseem is sown both **in drills 8 inches apart and broadcast,** and both methods have given excellent results. **Be particularly careful to sow shallow** so as not to bury the fine seed, as deep seeding means a poor stand and weakly stunted plants. This precaution is very necessary when drilling. As thick seeding is essential to good results, a fair average sowing per acre **in drills 8 inches apart** is from **8 to 10 lbs.** of seed; but when **broadcasting,** from **15 to 20 lbs.** will be required for the same area. After the seed has been sown, whether broadcasted or drilled, **the ground must be rolled** to firm and compact the soil around the seed. This rolling after sowing is most imperative.

IRRIGATING:—When growing Berseem under irrigation give the ground a good watering some days before sowing, then complete the seeding as soon as it is possible to get on the ground. **On no account irrigate** again until the seed is well through and the plants have got a hold on the ground, otherwise the seed is apt to be washed and a patchy stand will be the result. This is really a general rule and applies all sowings made on irrigable land.

SUBSEQUENT TREATMENT:—In the first growth Berseem sends up a single stem, carrying several leaves, but no side branches. When the plants are from 9 to 12 inches high, **take a cutting.** By this time, three or four side shoots will be showing at the base of the original stem. The **cutting encourages the growth** of these side shoots and causes the plant to stool out. After this first cutting, the side shoots grow rapidly and replace the first stem, so that under satisfactory conditions the second growth will be much thicker and denser, and will give a much heavier bulk of feed than the first. Four, five and six cuttings will be secured in a single season, especially where Berseem is grown in districts with a mild Winter, either under irrigation conditions or on moist ground. Seven cuttings are not exceptional, and one gentleman in the Bendigo district secured nine matured cuttings during 1920 from seed sown in the February of that year.

MIXTURES:—"Mesgawi" Berseem Clover gives excellent results in mixtures and can be sown this way with Skinless Barley, Italian Ryegrass, Tick Beans, Algerian Oats and Rye Corn.

MIXED PASTURES OF WIMMERA RYEGRASS AND SUBTERRANEAN CLOVER

The two **principal essentials** in determining the most productive pasture types for any particular district are **soil moisture conditions** and the **fertility of the land**. The former governs the annual or the perennial nature of the plants composing the pasture, while the latter controls the actual species of annual or perennial plants that may be sown and maintained to best advantage from an economic point of view.

Wimmera Ryegrass is in the same relation to Perennial Ryegrass as is Subterranean Clover to White Dutch Clover. **Both are annuals**, depositing their seed at the end of each growing period to perpetuate next season's crop, and both have a distinct "niche" in both high and low rainfall areas, though under the former conditions they should not replace perennial pasture plants on good quality soils. Another point of similarity is that both will thrive and do well on second, and even third class land, where the average annual rainfall is high, but when grown under low rainfall conditions each of them require relatively fertile soil.

This association of Wimmera Ryegrass and Subterranean Clover, either Extra Early Dwalganup or Mt. Barker type, **may be sown** on a well-prepared seed bed **in the Autumn or early Winter**, or in cases where late rains are assured, in the early Spring, although, generally speaking, Autumn or early Winter seeding is much safer, sowing at the rate of **15 lbs.** of Wimmera Ryegrass and **2 lbs.** of Subterranean Clover per acre.



Subterranean Clover and Wimmera Ryegrass growing in association under irrigation on the property of Mr. H. Hanslow at Tongala. Seed supplied by F. H. Brunning Pty. Ltd. From the "Commonwealth Agriculturist," by courtesy of Commonwealth Fertilisers and Chemicals Ltd.

The Subterranean Clover referred to in this article may be either the Extra Early Dwalganup strain or the Mid-Season or Mt. Barker type, according to the climatic conditions under which the mixture is to be sown. The directions given apply to both.

Under grazing conditions it is extremely difficult to maintain a proper balance between Subterranean Clover and Wimmera Ryegrass. Each plant demands a separate method of grazing.

Subterranean Clover in its young form is somewhat unpalatable, while at the same stage Wimmera Ryegrass is extremely so. Thus, in Winter, the stock are liable to severely punish the Ryegrass to the advantage of the Clover, and in addition, Subterranean Clover, owing to its extremely prolific growth tends to choke it out. This difficulty is accentuated when at seeding time Subterranean Clover protects its seed by burying it, while the Wimmera Ryegrass seed is readily grazed by all types of stock. Thus, as the seasons go on and the pasture re-establishes itself each year by re-seeding, there is a gradual increase in Clover and decrease in Ryegrass.

It would therefore **appear to be better policy** to sow Wimmera Ryegrass and Subterranean Clover in separate paddocks, and, indeed, under such conditions it can be grazed to the best advantage and the Ryegrass allowed to seed heavily by removing the stock for a few weeks in the late Spring. Ryegrass is not a good plant to produce **dry Summer feed**, and for this purpose the **Subterranean Clover** is much to be preferred. See the article on page 67 on Subterranean Clover for information as to whether the **Extra Early Dwalganup strain** or the **Mt. Barker type** is the more suitable for your conditions.

WIMMERA RYEGRASS & SUBTERRANEAN CLOVER (Continued).

Although in many instances it may be preferable to keep Subterranean Clover and Wimmera Ryegrass in separate paddocks, yet **there are considerable areas where the two may be advantageously combined** to give a good mixed pasture, and under such conditions the proper balance between the two plants may be kept in several ways:—

- (1) **By light stocking**, especially when the Wimmera Ryegrass is seeding, and followed by Autumn harrowing.
- (2) **Under heavy stocking conditions**, re-seeding with Wimmera Ryegrass every few years at the Autumn harrowing, to increase the grass content if necessary.
- (3) **By judicious manuring** with phosphates and nitrogen, and by careful control of grazing, it is possible to maintain both plants in their correct proportion.

Wimmera Rye responds well to Autumn and early Spring dressings of nitrogen, provided the phosphate content of the soil is high. **Careful controlled grazing is essential to prevent** the Wimmera Ryegrass getting too high in the late Autumn, and thus smothering the young Clover plants. If the pasture is kept grazed and not allowed to exceed from 3 to 4 inches high, one may keep the balance between Clover and Ryegrass.



Top-dressed Pastures at Corowa on Mr. J. Conroy's property. The "V" shaped portion in front was a section missed by the spreader. The sheep carefully avoided the unmanured sections of the paddock. From the "Commonwealth Agriculturist," by courtesy of Commonwealth Fertilisers and Chemicals Ltd.

Wimmera Ryegrass and Subterranean Clover have now definitely established the value of their association for Winter and Spring pasture for the following reasons:—

- (1) **Both are annuals** and will withstand dry Summer conditions and re-establish themselves by profuse re-seeding, if managed in the correct way.
- (2) **They give a good balanced ration** to stock when fed in conjunction with each other.
- (3) **Wimmera Ryegrass will supply feed in Winter** when Subterranean Clover is not at its best, and is rather unpalatable.
- (4) **The Wimmera Ryegrass will produce feed** when the Clover is attacked by the ravages of insect pests such as red spider and lucerne flea.
- (5) **Both will grow profusely** in areas with an annual rainfall as low as 15 inches, providing, of course, the soil fertility is sufficiently high.
- (6) **They respond splendidly to balanced manuring** with phosphates and nitrogen to give Winter feed.
- (7) **The Wimmera Ryegrass materially helps to counteract the "Clover taint"** in butter.
- (8) **With proper management**, the balance between the Ryegrass and the Clover may be easily preserved.

Wimmera Ryegrass and Subterranean Clover when sown alone as separate crops are dealt with in another portion of this book. (See pages 46 and 66). This article is to illustrate the usefulness of these two Permanent Pastures in conjunction. It is advisable at all times that only the best and most reliable seed be used, whether in mixture or sown separately.

To keep the pasture in the best condition, **top-dressing is essential**, and, generally speaking, **1½ cwt. of Superphosphate per acre** applied immediately after the Autumn harrowing and followed by an application of about **1 cwt. of Sulphate of Ammonia per acre**, about the middle or end of May, will give the best results. Under certain conditions a further top-dressing of Sulphate of Ammonia, about the end of July, would prove helpful in producing early Spring feed and maintaining the Wimmera Ryegrass—Subterranean Clover balance.

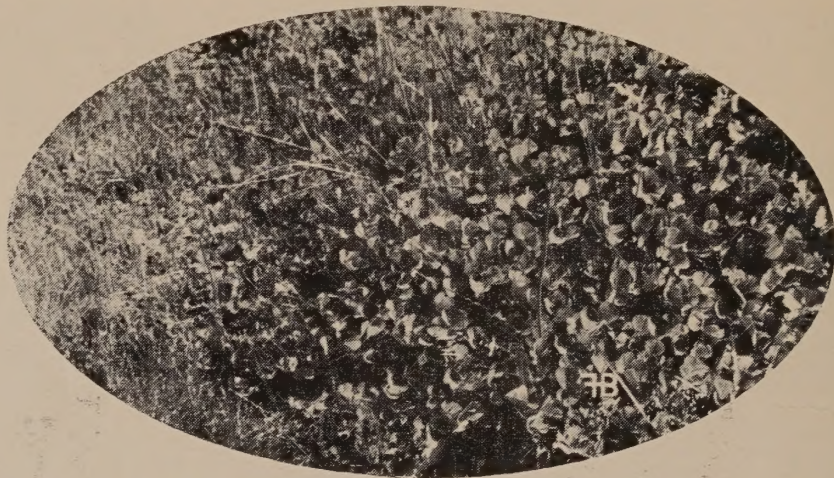
SUBTERRANEAN CLOVER

While Subterranean Clover serves the purpose of a perennial pasture, it is actually, botanically speaking, an annual possessing the **special faculty of re-seeding** itself each season, and when once properly established, is **quite permanent**.

This Clover derives the **name** of "Subterranean" from the manner in which the lower shoots force their seed pods into the soil, to lie there in readiness to perpetuate the crop when the rains come the following Autumn.

With the first Autumn rains, the dormant seed germinates, and in about ten days there is a thick carpet of foliage where previously the ground was bare. Subterranean Clover plants grow very close together, the stems crossing and overlapping to a depth of several inches, the whole forming a dense mass of nutritious and palatable herbage.

The plants die down at the end of the season, leaving a mass of stems and seed pods on and in the ground. This **period varies** according to the particular strain of seed sown down, the **Extra Early Dwalganup** flowering freely in August and September, and maturing its seed by the middle or end of October, while the **Mid-Season or Mt. Barker** type is much later, the seed not being formed and deposited in the ground until December, or even early in January.



The advantages of top-dressing. The luxuriant growth on the right shows a plot which has been dressed with 224 lbs. per acre of Superphosphate; the plot on the left was given no manure.

In the green state, Subterranean Clover is a succulent nitrogenous fodder, extremely **palatable to all stock**, especially sheep and cattle, which keep it closely fed down, even when there is an abundance of natural pasture available. The lower stems however, cling tenaciously to the ground, leaving the seed pods to penetrate the soil to produce the following season's crop, and thus prevent the clover from being eaten out. Sheep are also very partial to the residue after the plants have died down; on good stands, this **residue** is literally a mass of seed pods, containing nutritious feed and providing water is available, stock thrive remarkably well on this residue for several months, while no matter how hard the grazing of the dry plants, sufficient seed is left in the ground to produce the next stand.

CLIMATIC ADAPTABILITY:—Owing to its earlier maturing properties, the Extra Early Dwalganup strain is especially well suited to such districts as the Riverina in N.S.W., Northern Victoria, and other low rainfall localities where the average is from 15 to 20 inches per annum, and where the Spring comes in early with hot weather setting in rapidly thereafter. Under such conditions, the Mt. Barker or Mid-Season and other later maturing types are unable to flower and set seed before the weather conditions in the Spring become unfavorable, so that with these sorts, there is no seed deposited in the ground to perpetuate the crop the following Autumn.

The Extra Early Dwalganup strain **blooms at least five to six weeks earlier than** the better known Mid-Season type, and is thus able to complete flowering and set its seed before the dry weather and hot winds come in. The Mid-Season or Mt. Barker type will not succeed well where the average rainfall is less than 20 inches per annum, and although this type is very adaptable to all temperatures, climates varying from temperate to medium cold will give the best results. Each of these strains can be grown successfully whether **under irrigation** or relying on natural rainfall, and both will do excellently either grown alone or in mixture with other Grasses and Clovers.

Speaking in a comprehensive sense, Subterranean Clover is now established in most of the settled areas of Australia. It is very extensively grown in the South and South-Western parts of Western Australia, in most parts of N.S.W., throughout Tasmania, and in almost every district in Victoria, while the Mt. Barker district in South Australia is the original Australian home of the plant, the seed having originally been imported and first grown there by the late Mr. Archie Howard. Subterranean Clover is now being used to some extent in Queensland, but so far is only being grown in a small way compared with the other States of the Commonwealth.

SUBTERRANEAN CLOVER (Continued).

VARIETIES:—There are a number of types or species of Subterranean Clover, of which about three are regularly available in commerce. These are the **Extra Early Dwalganup**, the **Mid-Season or Mt. Barker** (South Australian) and the **Wenigup** or Late-maturing type. Of these, the Extra Early Dwalganup is an **early maturing sort**, establishing itself more quickly and freely than the other strains, and requiring less care and soil fertility to start growth on. **Early sowing** is in the best interests of this strain, when the plants will commence flowering as early as the beginning of July, blooming freely in August and September, making a maximum seeding, dying down and concluding their season about the end of October, or even earlier.

Apart from its general value, the special feature of the Extra Early Dwalganup strain is its **suitability for districts with a low rainfall**, such as Northern Victoria, the Riverina and other districts **where the Spring comes in early**, with hot weather setting in rapidly thereafter, and **thus preventing** the plants of later maturing types from flowering and setting seed to perpetuate the following season's crop.

The **Mid-Season or Mt. Barker** type is the original variety of Subterranean Clover introduced into South Australia by the late Mr. Howard many years ago, and the type has, until recently, represented 95 per cent. of the Subterranean Clover sown. While highly valuable for temperate climates, its later flowering period renders it unsuitable for districts where climatic conditions, owing to Spring coming in early, and hot weather setting in rapidly thereafter, prevent the plants from flowering and setting seed to produce the crop the following Autumn. Under such conditions, the Extra Early Dwalganup type is more suitable.



Subterranean Clover growing at Moyhu Park. From the "Commonwealth Agriculturist," by courtesy Commonwealth Fertilisers and Chemicals Ltd.

The **Wenigup** or **Late-maturing** variety is much later in flowering and setting seed than the Mt. Barker type, and its **suitability** is **restricted** to a few districts, and to special conditions.

The Extra Early Dwalganup strain is **distinguishable** from the Mid-Season or Mt. Barker type and other late maturing varieties, **by the color of the Calyx**. In the **Extra Early Dwalganup**, this is **bright green**, and sometimes bright green with a very faint red band, whereas in the later types, the Calyx is **red**.

EXTRA EARLY DWALGANUP:—The special features of this strain have already been dealt with. Certain other points of difference as compared with the Mid-Season or Mt. Barker type will be of interest. Extra Early **Dwalganup** Subterranean Clover **persistent and reproduces itself**, and is not apt to die out like the Mid-Season or Mt. Barker type if top-dressing is neglected, although it very readily responds to treatment. After neglect, an application of about 112 lbs. of Superphosphate per acre soon brings the **Dwalganup** strain back to its normal yield.

This strain establishes itself more freely and more quickly than the Mid-Season or Mt. Barker type, and **requires less care and soil fertility** to start growth on. It **provides earlier feed** in the Winter than the later maturing type and wilts (dies off) earlier than the Mid-Season, even when favorable conditions persist, and are very conducive to continued growth with the latter.

It is **not as good** for cutting for meadow hay as the Mid-Season or Mt. Barker type, and should not be sown for this purpose where the other can be grown. It is **more favored by stock** in the early part of the Winter than the Mid-Season or Mt. Barker type, and for this reason when grown on the same holding the Dwalganup strain provides an excellent opportunity of permitting the Mid-Season to strengthen and establish itself thoroughly.

SUBTERRANEAN CLOVER (Continued).

UTILITY:—It is not only valuable as a late **Autumn, Winter and Spring** pasture for sheep, cattle, horses or pigs, but it possesses the extra advantage of **helping to suppress weeds**. It yields a meadow or clover hay of **excellent quality**, and cut when "just on the turn," makes the best of hay for dairy cows, yielding as much as two tons of cured hay per acre. The fattening qualities of the plant, especially when cut with the seed fairly ripe, are remarkable. Its chief use, however, is for grazing.

It **does not taint milk** and can be recommended just as highly for dairying as for fattening. Subterranean Clover is **not dangerous as regards bloat**, although like all luscious fodders it has a tendency in this direction, but there is no more danger with this pasture than with Lucerne, and certainly less than with other Clovers. Under exceptional conditions, any rich pasture is liable to "blow" stock.

SOIL REQUIREMENTS:—The use of Subterranean Clover is not recommended on first class dairy land where better higher production plants can be grown, but is able to adapt itself to an unusually wide range of soil conditions, growing best on sterile sandy loam, where the drainage is good and lime available. Providing liberal dressings of phosphoric acid are given in readily available form (Superphosphate), it **will transform even poor cementy soils**, deficient in lime and badly drained, into country with a heavy carrying capacity. It does well on most clay soils, on all sands, and on drained peaty swamps.

Subterranean Clover is very **susceptible to the amount of available phosphoric acid in the soil**, hence the manner in which it responds to dressings of Superphosphate. On very light soils, a regular annual top-dressing is essential to maintain the pastures, but on better class country, the decline is less obvious, and top-dressing every second year will generally prove sufficient.

Superphosphate may be sown with the seed, and again used for top-dressing in the Spring, although after a very wet Winter, a mixture of Bone Dust and Superphosphate will give more lasting results. The quantity of Superphosphate to be used at time of seeding varies from **84 to 112 lbs. per acre** according to the quality of the land being sown down, and it has been definitely proved that the higher the rainfall, the less fertile the soil required; while in districts with a very low average rainfall, relatively good class land is necessary to grow Subterranean Clover successfully.

SOIL PREPARATION:—Very little soil preparation is necessary, a rough harrowing being all that is required. Indeed, many pastoralists establish the plant by carrying a pocket-full of seed, scratching the ground with a stick and stamping it in, leaving the first rains to do the rest. Lime, although not essential, except on very acid soils, is valuable with all Clovers, but **must be applied** some weeks before using fertiliser or sowing the seed. A little initial outlay on Lime and Manure is more than amply repaid by the subsequent results.

SEED SOWING:—Sow the seed as early in the Autumn as weather conditions permit, as where it is possible to seed in March and April, the plants have a much longer period in which to establish themselves before flowering and setting seed in the Spring. When sowing Subterranean Clover seed **fairly early** in the Autumn, it is advisable to **sow a little deeper** than later in the season, even as much as two inches in depth on light soil and sand.

When the seed is **sown early under a light covering** and there is no moisture in the ground, any plants which may be germinated by light rains followed by a dry spell, will **dry out and wilt**, and what was probably a good germination will often prove a failure, and that through **no fault of the seed**.

Early sowing is **especially essential** with the **Extra Early Dwalganup** strain, and under such conditions, the plants commence flowering much sooner, even as early as July, continuing to bloom freely in August and September, thus making that maximum seeding which is so very essential and such a desirable attribute the first Season. **Good stands of the Mid-Season or Mt. Barker type** have been secured by **sowing as late as July**, or even August; but as the plant is a self-seeding annual, a good deposit of strong vigorous seed is essential the first Season if the pasture is to be established permanently.

When sown alone, from **two to three lbs.** of seed per acre will be sufficient, but as the initial seed cost is the only one, a **more liberal sowing** in the first place **will ensure** a thicker stand the first year, thus enabling the Clover to establish itself more thoroughly for the second season. Once Subterranean Clover is properly established, there is no necessity for re-sowing, and on this account the seed should not be stinted, so that **5 lbs., 6 lbs., or even 7 lbs.** of seed is not too much for an acre where a quick stand is desired.

Fertiliser may be applied when preparing the land, or, **better still, mixed and sown with the seed**, so that both are distributed in the one operation. The mixture of seed and fertiliser can be sown through the manure run of the drill, allowing the hoes to just scratch the surface of the soil; this can be effected by disconnecting the conveyor tubes and allowing the seed to broadcast itself. Should the soil be at all loose or tending to try out, **roll after sowing**, otherwise a brush harrow will cover the seed satisfactorily.

When mixing Subterranean Clover or, for that matter, any other seed with Superphosphate, remember **sowing must follow without delay** so that the seed and manure is **not allowed to stand mixed** for say, more than an hour or two; after this time the manure is liable to burn the seed and thus impair its germination, but **providing sowing is proceeded with promptly** after mixing, **no danger need be feared** from this excellent labor-saving operation.

SUBTERRANEAN CLOVER (Continued).

SUBSEQUENT TREATMENT:—To get a field established quickly, it is necessary to sow thickly, although where light seedings are used the runner development may be relied on to thicken the pasture in due time. **The secret of success is to shut up the freshly sown paddock the first Spring**, as if grazed during this period the runners are liable to be pulled up by the stock, and the strength of the remaining plants materially checked, while by resting the Clover from the middle of September onwards, it is afforded every opportunity to make a good seeding, the benefit of which will be observed in future seasons. When the Clover is sown in a mixture with Oats or with Grasses and other Clovers for hay, the latter must be allowed to get fairly ripe before cutting, so as to give the Subterranean a reasonable opportunity of seeding, and **when cutting it is necessary to leave a longer stubble than usual**. In subsequent seasons these precautions are quite unnecessary. No cultivation is needed at any time.

MIXED STRAINS:—The two strains—Extra Early Dwalganup and Mid-Season or Mt. Barker—also **grow very well in association together**, especially with a mixture consisting of 60 per cent. of the former and 40 per cent. of the latter. The Extra Early Dwalganup provides the bulk of the feed in the Winter and early Spring, and when it is going off, the Mid-Season is growing strongly.

This mixture will, for many districts (even in temperate climates), be found superior to growing either of these strains separately and alone, and this **association of the Dwalganup and Mt. Barker types provides a maximum of grazing per acre over the longest possible period each year with Subterranean Clover**.



Ryegrass and Subterranean Clover being cut with a Special Divider.

TOP-DRESSING:—Subterranean Clover responds very readily to available Phosphoric Acid in the ground, but will do fairly well under the most unfavorable conditions even without fertiliser. A **top-dressing of from 84 to 112 lbs. of Superphosphate per acre**, either broadcasted or drilled in the Spring, makes a wonderful difference, and the extra returns well repay any time and labor spent in this direction. On light soils, the vigor of the Clover declines rapidly until ultimately the plants become stunted and of little value, although upon being top-dressed it responds rapidly and is soon completely restored, hence the necessity for annual treatment. On this class of soil **from 168 to 224 lbs. of Superphosphate** might with advantage be used after seeding, following with an application of 112 lbs. of Superphosphate every Spring.

On better class land, the decline is not so rapid, and the response to fertiliser is even more wonderful. **Top-dressing** under these circumstances is **also desirable, using 112 lbs. of Superphosphate per acre**, while that amount might profitably be doubled every second year. In some districts, top-dressing may be done in the Autumn, when the Clover is about to start into growth, but **application in the Spring will generally be found more satisfactory**, especially in very cold wet districts.

GENERAL:—Subterranean Clover is particularly well adapted to growing in mixtures with other Grasses and Clovers, both with and without irrigation. See the article on page 64 for the **Wimmera Ryegrass/Subterranean Clover** association.

In Gippsland and under similar conditions, it is a **good plan to top-dress Paspalum** with Superphosphate, adding a light seeding of Subterranean Clover. These two plants make an excellent combination and furnish good feed practically the whole year, the Clover being dormant in the Summer, and when it dies off, the Paspalum is at its best.

Subterranean Clover will **largely suppress Sorrel** and it will also **choke out Cape Weed, Silver Grass and Onion Grass**. It will not kill Bracken, but if the Fern is cut and burnt, and Subterranean Clover sown at the rate of from 4 to 6 lbs. per acre, liberally mixed with Superphosphate, it will materially help in crowding out the Fern, because more stock can be carried amongst the Fern, and when grazing they nibble off the young shoots concealed by the Clover and bruise and tramp the tender Fern fronds. Subterranean Clover **has also been known to counteract the poisonous effects of Lobelia Weed** on the Western Plains of Victoria.

STRAWBERRY CLOVER

Brunning's "TARWEI" Strain.

"Tarwei" Strawberry Clover is a perennial plant with spreading stems, pink flowers, and foliage very similar to White Dutch Clover. The name has been derived from the seed heads, which very much resemble the fruiting Strawberry in appearance, but there is also a further similarity, inasmuch as the Clover throws out runners and roots as it goes along, thus establishing itself very quickly after the first season, during which growth is slow.

UTILITY:—"Tarwei" Strawberry Clover is **primarily a pasture plant** and is principally used in this way; but, in addition, it makes Clover hay of first class quality, although when required for this purpose it is better grown in mixture with other Grasses and Clovers. Where soil and climatic conditions are congenial, "Tarwei" Strawberry Clover is without doubt **the best milk producing and the best fattening plant** that can be grown for grazing, and furnishes excellent pasture for sheep, cattle, horses and pigs alike. Sheep, however, must not be allowed to graze on it too long, owing to their habit of biting the plants too close to the roots, which has a tendency to check the Clover; and if the sheep are allowed to eat it down continually without a spell, the plants do not get a chance and are liable to be killed out. This emphasises the **necessity for judicious grazing**, but is likewise an excellent testimonial to its palatability.



"Tarwei" Strawberry Clover is one of the most highly nutritious Permanent Pasture plants for dairy cows.

CLIMATIC CONDITIONS:—"Tarwei" Strawberry Clover is particularly valuable for districts within 50 miles of the sea-coast, as it seems to revel in the salt air, **but its range is not limited to such places**, and where the right soil conditions are available, it can be successfully grown inland, as witness first class stands on the River Murray and at Corryong. The plant has given excellent results under irrigation in Northern Victoria, although under such conditions when the irrigation water is on in the Summer it is liable to burn and scald with the hot sun.

SOIL REQUIREMENTS:—The plant is fairly adaptable as regards climatic conditions, and will under reasonably suitable conditions give splendid results in districts ranging from temperate to cold, but it requires moist, heavy land to grow it to perfection. The home of "Tarwei" Strawberry Clover is on salty matured heavy ground, and generally the best returns will be secured near the sea-shore and up to 50 miles or so inland. On drained swamps of loamy and peaty character, on black river flats, and for land liable to crack in the Summer it has no equal. Excellent results will be obtained on any damp low-lying heavy land, and "Tarwei" Strawberry Clover will stand being covered with flood water for a considerable period without suffering injury.

Given a fairly rich soil containing sufficient lime, "Tarwei" Strawberry Clover will be wonderfully successful, and if the subsoil remains moist through the Summer it attains its greatest value. It is in a general way a late Spring and Summer grower, and one of its great points of value is that **it provides a considerable amount of highly nutritious and palatable feed** in the Summer and Autumn **when other pasture has dried off**, so that with a Strawberry Clover pasture it is safe to buy stock when many other farmers are compelled to sell. No other pasture can excel it for fattening or milk production.

SOIL PREPARATION:—Soil preparation is not essential, but where conditions permit, the preparation of a first class seed bed such as required for Lucerne will be well repaid. The condition of land suitable to "Tarwei" Strawberry Clover in many instances precludes the possibility of any initial preparation of the ground. If, however, the tussocks can be cut and burnt, the seed will get a good start sown in the ashes.

The need of lime in the ground is a question on which there appears to be a considerable diversity of opinion, but it seems certain that where this element has not been applied either prior to seeding or at some subsequent stage, the soil must already contain a sufficient supply.

"TARWEI" STRAWBERRY CLOVER (Continued).

WHEN AND HOW TO SOW:—"Tarwei" Strawberry Clover may be sown at any time from the **middle of March** until **early July**, and in some moist districts even up to the first week in August. The earlier the seed is sown, the longer the growing period available before the Summer, and the longer the plant has to establish itself before being called on to withstand the first period of hot weather, the better. "Tarwei" Strawberry Clover will not yield much pasture during the first season, and appears to be slow in establishing itself in the initial stages, but after the first Summer, grows rapidly and luxuriantly, year after year, and can be grazed for nine out of the twelve months of the year when not flooded in Winter.

When sown by itself, **2 lbs. of Brunning's "Tarwei" Shelled seed** broadcast will be found sufficient to adequately sow an acre, and to ensure an even distribution the seed should be mixed with dry sand when sown alone.

When seeding, endeavor to sow right on the surface, as if planted too deeply, a considerable quantity of the seed will fail to germinate, this giving rise to the old bogey, long since exploded, that Strawberry Clover cannot be established from seed.

SUBSEQUENT TREATMENT:—Apart from a rolling where possible after sowing the seed, no further treatment is necessary **except a top-dressing** of Superphosphate at the rate of 112 lbs. per acre every year about late July or August. This, together with judicious management of the paddock, will provide grazing for a very lengthy period of the year, and in districts with congenial conditions and not liable to floods, so that the stock can get on the land, "Tarwei" Strawberry Clover may be relied on for pasture for at least nine months of the year. The plants thrive from being kept eaten down, and one practical grower states that Strawberry Clover is quite permanent if kept grazed, but that it will dwindle and die out if not fed off.

Where the plant is growing on land subject to floods, the annual top-dressing is usually unnecessary as the silt brought down by the flood waters supplies the necessary elements.

IN MIXTURES.—"Tarwei" Strawberry Clover **associates splendidly** with other Pasture Grasses and Clovers and **grows well in mixture** with Perennial Ryegrass, Cocksfoot, Timothy, Paspalum Dilatum, White Clover and Alsike Clover. Some **specimen "standard" mixtures** are shown on pages 16 and 17.

The **seed is high in price** compared with that of most other Clovers and for the sake of economy, it is not always advisable to sow actually mixed with other Pasture Seeds. On many properties, there are **moist places very suitable for "Tarwei" Strawberry Clover**, whereas the remainder of the paddock **may not be adapted** to its growth. Similarly on **irrigation holdings**, there are wet spots and depressions **where the water lodges** which remain in a more or less moist condition the whole year round. Under such conditions, quite a large proportion of the Strawberry Clover seed would be wasted if sown over the whole paddock with the general mixture, and in these cases it is advisable to **purchase this seed separately** and to broadcast it in a second operation on such positions only.

ALSIKE CLOVER (Trifolium Hybridum)

Alsike or Swedish Clover is a perennial somewhat similar to White Clover, but lacking the creeping stems of the latter, and is said to be a "cross" between the White Dutch Clover (*T. Repens*) and Red Clover or Cowgrass (*T. Pratense*). The flowers are of a **pale pinkish shade** and similar in appearance to those of White Clover.

The plant is thoroughly perennial, **very hardy** as regards extreme cold and withstands surplus moisture well. It is adapted to both cool and humid localities where there is a good annual rainfall and does especially well under irrigation in Northern Victoria. It is **not suited** to very dry conditions.

The main **season of growth** is during the Winter and Spring and the plants are practically dormant in the Summer. It will grow on all classes of land suitable for White Clover and will also thrive on land **inclined to be acid**, therefore, being adapted to sowing on what are known as "wet" soils.

The plants attain a height of from 21 to 24 inches and provide a large amount of leaf and Alsike will stand cutting better than Red Clover or Cowgrass. It may be **pastured, cut for green feed** or saved for a **hay crop**. The hay cures easily and has a high feeding value.

It is one of the most palatable of the Clovers, and for this reason **where grown alone**, the usual **precautions against "bloat"** must be observed. Where there is a large proportion of Grasses in the pasture, the danger is considerably minimised in this respect and practically no trouble is likely to be experienced.

Owing to its **tendency to "lodge,"** Alsike is **seldom grown alone** either for hay or pasture and is **generally used in mixture** with other Grasses and Clovers. It makes an excellent association with Timothy sown at the rate of **15 lbs. of Timothy and 3 lbs. Alsike** per acre, and a proportion should be included in most other Permanent Pastures. (See also **pages 16 and 17**). When sown alone, **12 lb. of seed** is required for an acre, but **with other Grasses and Clovers from 1 lb. to 2 lb. per acre** is the usual quantity included.

As a **honey plant**, Alsike is extremely valuable for apiarists, and with the exception of Sweet Clover (*Melilotus Alba*) is the best of the Clovers in this respect.

The seed should be sown in the Autumn or early Winter and Spring sowings (**except under irrigation**), are not recommended for Alsike Clover.

LOTUS MAJOR OR VILLOSUS

(Greater Birdsfoot Trefoil)

Lotus Major is the most valuable member of the Birdsfoot Trefoil family, which includes many species. It is a deep-rooted leguminous perennial **thoroughly permanent** when once established, and very adaptable to different classes of soil. The plants send down strong tap-roots, and these, on reaching the clay subsoil, send out laterals, which come up all round the parent plant. On the surface, Lotus Major forms runners, which, rooting at every joint, soon establish the plant and ensure its permanency. Owing to its habit of growth, it soon smothers other grasses and weeds, and is particularly valuable for killing tussocks and checking the growth of bracken fern.

Other members of the family most generally grown are the **Lotus Corniculatus** or Minor Birdsfoot Trefoil, **Lotus Angustissimus** and **Lotus Hispidus**, sometimes known as Boyd's Clover or Gibley Grass. The two latter species are only annuals.

Lotus Corniculatus is now attracting much attention owing to its suitability to hot climatic conditions and is proving very promising under experiment in Queensland, where it is likely to **rank next to Lucerne** as a permanent leguminous crop. There is little scope for its use in Victoria.



Lotus Major growing on swampy land on the property of Mr. T. Reynolds at Molesworth. This plant not only helps to eliminate tussock growth but provides good Summer green feed on swampy land. From the "Commonwealth Agriculturist," by courtesy Commonwealth Fertilisers and Chemicals Ltd.

Rhodes Grass is one of the finest of Hay Grasses where climatic conditions are suitable. See pages 30 to 32.

UTILITY:—Lotus Major is of extremely high feeding value and excellent for fattening cattle for market, as a milk producer for dairy cows, or as a pasture for sheep, horses or pigs. When cut and cured, it makes a hay of first class quality. It may also be regarded as a **land improver**, owing to its habit of converting useless and abandoned forest country into first class grazing areas.

Grazing is the most economical method of using Lotus Major and the one most generally followed. There is no danger of this plant ever becoming a pest and it does not appear to be troublesome in respect to bloat.

CLIMATIC REQUIREMENTS:—Lotus Major is best suited to districts with a moist climate, and although generally regarded as a moist ground plant, also appears to grow well in certain fairly dry situations, and yields medium to good results on land varying from stiff clay to sandy loam. It roots and runs, and soon forms itself into dense sward, doing well on either hill land or marsh country, while it is particularly valuable in forest country, where the **rainfall averages over 30 inches per annum**. The **most suitable soil** is moist forest sand, such as is found in bracken country. On swampy land that only grows rushes and useless vegetation, Lotus Major will thrive, and growing rapidly, soon chokes out the rushes and sags, while it converts sour and abandoned forest country into excellent grazing land.

SOIL PREPARATION:—The conditions under which Lotus Major is grown usually preclude any elaborate soil preparation, although where possible, a well prepared seed bed will, as with all cultivated plants, do more towards ensuring a good stand; but **generally**, Lotus Major is **sown on a "clean burn,"** and does particularly well sown in the ashes after burning scrub, especially in damp places. It is easily established on any forest country that will carry a light fire, and once established is permanent, the stand improving with age. The most suitable fertiliser is **Superphosphate**, used at the rate of from **84 to 112 lbs. per acre**.

LOTUS MAJOR (Continued).

WHEN AND HOW TO SOW:—Seed of Lotus Major is generally broadcasted, and when sown by itself, should be mixed with dry silver sand, in order to ensure even distribution. The best sowing period is from the first Autumn rains in March or April up to the beginning of June; although, under suitable conditions, seed may also be sown in August and September. When seeded alone, the quantities vary, and up to 7 lbs. per acre is sometimes used, but from 3 to 4 lbs. of Brunning's Supergrade Quality seed will be found ample to establish a good stand, and as the plant soon spreads, any blank spaces are quickly covered.

It is advisable, wherever possible, to sow just prior to rain, as after showery weather the seed soon germinates and the plants quickly make rapid growth. Where weather conditions are unfavorable, Lotus Major is slow in starting, and on this account it is really better sown alone, as when seeded in mixtures, the other Grasses and Clovers usually strike first and are apt to smother out the Lotus Major while it is still in the younger stages of growth.



Showing the persistency of Lotus Major among Bracken Fern, etc. It carries a fire well, and recovers rapidly after the burn.

SUBSEQUENT TREATMENT:—The plant at first makes rather feeble growth, especially if weather and other conditions are unfavorable, but once established, is quite hardy, and thence onwards grows strongly, making rapid progress. It seems to grow stronger and taller in a paddock of bracken fern, apparently appreciating the protection thus afforded. **The plants keep green throughout the whole of the year**, and are thus valuable for adding the necessary succulency to the feed when other Grasses and Clovers are dormant. The more closely cropped a thoroughly established paddock of Lotus Major is kept, the better, as close feeding encourages the plants to stool out and spread; while if it is desired to feed green, rather than to graze, the crop can be protected from the stock, when several cuttings will be obtained in a single season. When cut after the blooming period, **Lotus Major makes hay of excellent quality.**

COMPARISON WITH STRAWBERRY CLOVER:—The points of similarity of these two excellent Clovers are that both will stand flood and revel in moist conditions; both are of creeping habit and thoroughly permanent, and both yield fodder practically the whole year round. Both are extremely valuable for fattening sheep, cattle, horses and pigs, and each ranks very high as a milk producer.

The principal points of difference in their use are in the soil and class of country. **Brunning's "Tarwei" Strawberry Clover** is valuable for heavy river flats, black loamy soil, salty ground, and heavy land liable to bake and crack in the Summer. It is especially useful for binding wash-outs. "Tarwei" Strawberry Clover is also best adapted (but not exclusively) to conditions within, say, 50 miles of the sea-coast, and seems to thrive on the salty ocean breeze.

Lotus Major appears to be best suited to land containing a proportion of sand, and gives the best results on sandy marsh-land, heavily timbered country and sandy forest and bracken fern country. It is partial to the damp, sandy soil in creeks, gullies, and hilly forest clearings, and should be planted for preference on dirty, saggy country, and land that has not been cleared, even if it is heavy ground, and it is especially valuable on bracken fern country.

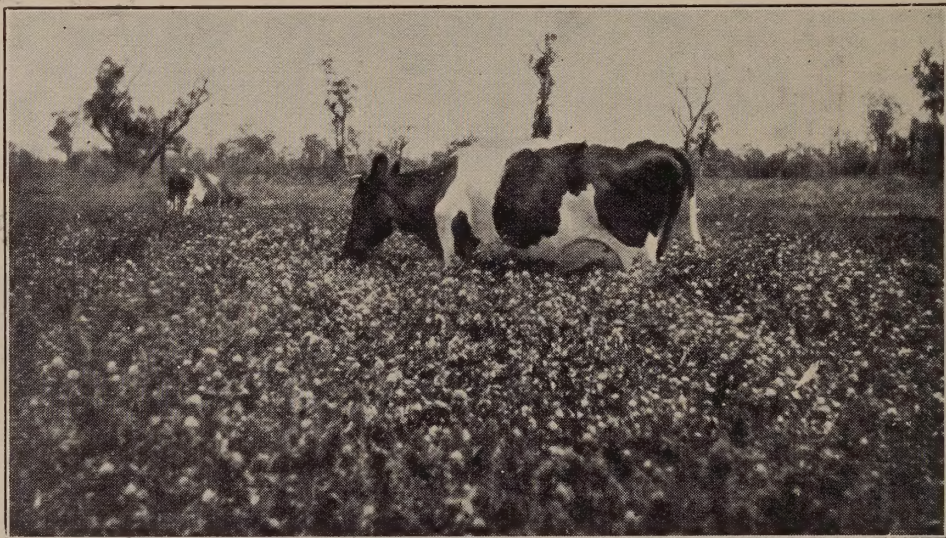
BRUNNING'S GENUINE GIANT COLONIAL COWGRASS

The splendid results secured in Gippsland and other parts of Victoria with **Brunning's Genuine Giant Colonial Cowgrass** as a Permanent Pasture, make it very necessary that the plant is not confused with the ordinary biennial type of Red Clover or Cowgrass, and it is also **essential** that the "**Genuine**" strain of seed is sown.

Brunning's Genuine Giant Colonial Cowgrass is a very heavy yielder, and when sown under anything like reasonable conditions, in the Autumn, it should be **possible** to take **four or five cuttings** the first Season. From Spring sowing, a cutting for green feed should be available about the middle of December, and if the crop is left for this purpose and not grazed, two more cuttings at least should be obtained before the end of April.

It is also a **good proposition as a hay plant**, giving from one to one and a half tons per acre from the first cutting of the first mowings, and essentially larger yields from subsequent cuttings.

CLIMATIC ADAPTABILITY:—Giant Colonial Cowgrass is most adaptable in this respect, and has already proved its suitability for the South-West of Western Australia, as well as for many parts of New South Wales, South Australia and Tasmania. It has now been successfully established for many years in Gippsland, the Western District, and other parts of Victoria, and therefore **possesses a very wide range of adaptability**, with the additional advantage that it **can be grown successfully under conditions unsuitable** for Lucerne.



.Brunning's Giant Colonial Cowgrass, on the property of Mr. C. H. Henning, Hamel, W.A..

COMPARISON WITH RED CLOVER:—The **true Genuine Giant Colonial Cowgrass** (given the right methods of treatment) is a **permanent** pasture plant, remaining at a high state of productivity for five or six, or even ten years, while the **ordinary Red Clover** is, at the best, a **biennial**, although a few plants here and there may persist for three or four years. The Genuine Giant Colonial Cowgrass is a stronger, taller growing plant, making considerably more growth than Red Clover and being a much higher yielder. These are facts which must be taken into careful consideration when purchasing seed, especially where only a temporary ley is required, as the ordinary Red Clover, which is several pence per lb. lower in price, may very often fill the actual requirements of the moment. In most instances, the expert has little difficulty in detecting the difference between these strains by the seed, but the best guarantee of genuineness is, as with all seeds, to buy one's requirements from a reliable, reputable, legitimate Seedsman. **Brunning's strain** of Genuine Giant Colonial Cowgrass is the surest and most satisfactory to purchase.

UTILITY:—Giant Colonial Cowgrass may be **grazed, cut for green feed, or saved for a hay crop**. The plant is of especially high feeding value and very palatable to stock of all kinds. Many dairy farmers **take a cutting and then graze**, but under such conditions Cows should not be permitted to pasture for more than half an hour or an hour immediately after milking. **Short spells of grazing** will ensure much better results than by leaving the cattle on the Cowgrass for a longer period.

Apart from its value for dairy Cows, Brunning's Genuine Giant Colonial Cowgrass is also particularly suitable for fattening bullocks and sheep, as well as for feeding horses and pigs. The results evolved from this excellent pasture are the best testimonial to its usefulness.

STRAIN:—Be careful that **only the true parent strain of Brunning's** Genuine Giant Colonial Cowgrass is sown. The ordinary biennial Red Clover or Cowgrass is quite distinct and inferior to the genuine type.

SOIL REQUIREMENTS:—Giant Colonial Cowgrass appears to be very adaptable as regards soil requirements, and will give excellent results on from heavy to light loamy ground. It is not an aquatic, is not suitable for swampy conditions, and requires well-drained ground. For wet country and swamps, "**Tarwei**" Strawberry Clover or Lotus Major is more suitable.

BRUNNING'S GIANT COLONIAL COWGRASS (Continued).

FERTILISER:—For Autumn seeding sow 112 lbs. of Superphosphate per acre with the seed, and then top-dress in the Spring with 112 lbs. of the same fertiliser, the beginning of October being the most suitable time. When sowing in the Spring, it is not necessary to use any manure at the time of seeding, but early Spring sowings require top-dressings about the middle to the end of October, with from 168 to 224 lbs. of Superphosphate. The quantities given can only be approximate, and depend entirely on the quality of the land.

BLOAT:—When grazing cattle or sheep on Giant Colonial Cowgrass, or for that matter any of the Clovers, there is always some danger of hoven or bloat. This danger is greatest when the animals are turned in on the Clover in a ravenously hungry condition, or when it is wet with rain or dew and in a more than ordinarily succulent condition. The chances of "bloat" may be minimised, although not altogether eliminated, by giving the animals access to other food, such as dry Clover or Lucerne hay, before turning them in on the pasture, and also by only allowing stock on for a short period of, say, half an hour to an hour. Where the field consists of mixed grasses and clovers, the danger is always less in proportion as grasses are abundant in mixture.



The value of Brunning's strain of Genuine Giant Colonial Cowgrass Harvesting for hay on the property of Sol. Green, Esq., "Underbank," Bacchus Marsh.

SOWING THE SEED:—A fine seed bed is essential, and it is necessary to work the land well, finally harrowing lightly to compact the soil before sowing. The seed may be sown from the first Autumn rains up to the middle of June, and again from the middle of August up to the end of September, but it is not advisable to sow during the coldest period of the year—from the middle of June to the middle of August. Harrow the ground well before seeding, and when sowing in the Autumn use $\frac{3}{4}$ to 1 bushel of Algerian Oats as a cover crop. Seed may be either broadcasted or drilled, and when sowing in March or April use 6 lbs. per acre in drills and 8 lbs. broadcast. When sowing from the end of April to the middle of June use 8 lbs. in drills and 10 lbs. per acre broadcast. For Spring sowing, from the middle of August to the end of September, it will not be necessary to use the Oats as a cover crop, in which case sow 10 lbs. per acre in drills and 12 lbs. broadcast. Do not on any account harrow the seed in, either roll it very lightly or do not touch it at all after sowing. The experience of several Soldier Settlers in Gippsland was that harrowing after sowing, covered the seed too deeply and it did not come through. Satisfactory results will be obtained by not touching the land after sowing, leaving the rain to wash the seed into the well prepared bed. It has been definitely established that Giant Colonial Cowgrass will not germinate unless sown right on the surface.

SUBSEQUENT TREATMENT:—In the normal season from an Autumn sowing the first cutting should be available late in October or early in November, while from a Spring seeding the first cutting will be ready from about the middle to the end of December. It is preferable to cut rather than to graze the first crop, but experience has proved that thereafter it will be more satisfactory to pasture, and this may be done in from ten to fifteen days after taking the first cut, the time, of course, varying according to the weather conditions. In order that the Giant Colonial Cowgrass be not too heavily pastured, it is advisable, if possible, to cut up into medium-sized paddocks so that stock may be moved from time to time, thus giving the Cowgrass every opportunity to recover quickly. There is no other special treatment necessary, except the annual top-dressing with Superphosphate previously referred to.

THE CONSERVATION OF FODDER

When the seasons are bountiful and growth is exceptional, the conservation of fodder may seem rather superfluous, but **unless provision is made** during years of plenty, when the dry unfavorable seasons recur the supplying of the fodder which is then so urgently needed may prove both difficult and costly.

The two principal means of Fodder Conservation are **Pasture Hay** and **Ensilage**. The former can be made and stacked cheaply, while the latter can be stored in pits, stacks or overhead silos at a very small cost per ton. With a **good reserve of fodder the farmer can increase his carrying capacity and in addition has an insurance** (without paying premiums) against bad seasons.

MAKING PASTURE HAY.

The value of Pasture Hay, especially for use as fodder during the Winter, is now well appreciated and many farmers regularly reserve a portion of their pastures for that purpose. Hay, both from Lucerne and from a mixed Grass and Clover pasture, has a very high fodder value and is nutritious and palatable to all kinds of stock.

A great **advantage of "hay"** is that it can be stored for a lengthy period to be used as required, it is not subject to attacks of mice and other vermin and it only needs protection from the weather to be kept in good condition.



Stacking Hay at Wunghnu. From the "Commonwealth Agriculturist," by courtesy Commonwealth Fertilisers and Chemicals Ltd.

Brunning's Government "Certified" Extra Early Dwalganup Subterranean Clover is the right strain for hot, dry districts where the Summer comes in early and where the later maturing Mt. Barker type is unable to re-seed itself. See also page 67.

Hay-making may appear simple, but there is plenty of room for skill in the work, particularly when the weather is not propitious. While in various districts the details of harvesting and stacking grass hay may vary slightly owing to climatic conditions as well as to a difference in the varieties of plants making up a pasture, in the main, the principles are similar. The principal consideration is to get a maximum quantity of hay rich in digestible nutrients.

The period of maturity at which grasses are cut for hay largely influences the bulk of the crop, as well as its palatability and value as food, but it must also be remembered that careful handling after cutting is equally as necessary as is cutting at a particular time.

The **time for cutting** is when the bulk of the plants composing the pasture are coming into flower—i.e., when the anthers or pollen sacs are thrusting between the chaff scales as it is at this time that the greatest amount of digestible nutrients will be obtained, or in other words, cut the grass before it begins to dry off. Bear in mind also that **"Late cutting weakens the pasture"** and that if left beyond this stage, the nutriment is utilised to aid in maturing the seed, so that the riper the grass, the more rapidly is the nourishment used by the developing seeds. In common with other forage crops, weather conditions greatly govern the time of grass-haymaking and the work should be carried out in such a manner that, on the approach of bad weather, the material can be got together with a minimum of handling and the exposure of the least possible surface to rain.

The crop is usually cut with a mowing machine or a scythe, leaving each swathe until the following day, to permit of the evaporation of moisture, as while freshly-cut grass may contain about 82 per cent of water, grass hay should contain only about 18 per cent., and the superfluous moisture is got rid of by exposure to the sun and the wind.

THE CONSERVATION OF FODDER (Continued).

In drier localities, however, the crop may immediately be raked into small windrows. The next morning these are collected with a horse-rake into large windrows, and in the afternoon of the same day, might be run into cocks. When weather conditions are favorable, the gathering of the crop into cocks may be dispensed with altogether and the hay carted from the windrows to the stack, an arrangement that means a minimum of handling, and with good weather the hay will be in the stack on the third or fourth day after cutting.

On account of the damaging effect of rain, endeavor to harvest in fine weather, even though it means an early cutting, or possibly, in other circumstances, a late cutting. In this connection, it might be pointed out that while early cutting may mean a loss in weight, it is offset to some extent by the increased aftermath growth. Though late cutting means a more fibrous crop and one requiring more delicate handling, it is better than the crop cut just at the right time but subsequently damaged by rain.



Sweep cleaning up windrow of Grass Hay. From the "Commonwealth Agriculturist," by courtesy Commonwealth Fertilisers and Chemicals Ltd.

Where climatic conditions are suitable, Rhodes Grass is one of the finest hay grasses grown. See pages 30 to 32 for full details.

When making hay from purely clover pasture, much gentler handling is required to prevent damage to the fine leaf. This crop can be left in the swathe for a day or two to allow the exposed surface to dry sufficiently, after which it should be carefully turned out to allow the nether side to dry. When this is accomplished, the swathes are gently put in windrows and thence carted directly into the stack, cocking being avoided if possible.

In stacking, the object is to exclude as much air as possible, and this is secured by spreading the hay evenly and by trampling, so that fermentation will be kept within bounds. If the stack is properly consolidated in this way, the hay will develop an agreeable aromatic odor, and there will be no sign of mildew. Should the material be too green or too damp when stacked, heat generates to such an extent as to produce charring. This lessens the palatability of the hay and is also liable to cause serious digestive derangements in the stock eating it.

THE MAKING OF ENSILAGE.

Ensilage is firstly a means of utilising surplus crops not required at the time and secondly a **high class form of fodder**, in addition to its economic value as a stand-by when other feed is scarce. It is said that no sheep and cattle will fatten as well on hay, nor will the flesh be as lean and juicy as when fed on ensilage, as the latter is the **nearer to natural food** and certainly easier and more economical to make than hay.

A simple way of making this ensilage is to excavate a pit of any length required, but only three or four feet deep, with just sufficient width at the bottom to permit of a cart and horse passing through. Do not make the sides vertical, but allow them to slope outwards towards the top to allow the material when sinking to wedge itself against the sides. The approach to this pit should be graded to enable a horse and cart to go right through, and the constant traffic soon presses the material into a solid mass, which can then be covered with earth thrown from the sides.

As each load is filled in, scatter about 14 lbs. of salt over it, as **in addition to improving** the smell, color and taste of the silage, salt is an antiseptic which regulates the heat of the pit by controlling heat-generating bacteria.

By the above method, there is no need of any buildings or machinery, all that is required being a little shallow excavation, which makes the filling and emptying a light task.

THE CONSERVATION OF FODDER (Continued).

THE MAKING OF ENSILAGE (Contd.)

If **Lucerne** is preserved in this way, **the full value** of the leaves is **retained**, whereas much of it is lost when Lucerne is converted into hay. While there is no doubt that hay is required on any mixed farm, especially as a binding feed for horses and cattle when grass is wet, it will be found that the **most economical method of keeping the main bulk of fodder is in the shape of ensilage.**

Another method is the **Stack system** (see illustration below), in which it should be arranged that the settled stack **does not exceed from 6 to 8 feet in height**; this means **building from 14 to 16 feet**. If the fodders are mixed, **put the drier stuff in the bottom of the stack.**



Making Stack Silage from Ryegrass and Clover. From the "Commonwealth Agriculturist," by courtesy of Commonwealth Fertilisers and Chemicals Ltd.

ADVANTAGES OF ENSILAGE.

1. Has same food value, pound for pound of dry matter supplied, as green forage.
2. Increased palatability.
3. Digestibility increased as well as digestibility of other foodstuffs fed with it.
4. Many prickly, spiny or fibrous plants make fair silage and would otherwise be useless.
5. Can be made when the crop is ready, whether the weather is wet or dry.
6. No damage done by birds, mice or weevils, and no danger of fire. Can be kept indefinitely.
7. Uses up materials which would otherwise be wasted.
8. Increases carrying capacity and reduces drought risk.

Keep the outsides high and the centre low and finish off with the centre slightly higher than the outside, and **during building**, rake down the outside of the stack repeatedly. Poles may be used on the outside of the stack, especially if coarse, green material such as Maize is being used. Bags of earth for weighing down are most suitable and may be removed if uneven settling or bulging occurs. **Protect the stack** from drying by covering the side exposed to the chief prevailing wind. Ground rock phosphate may be added at the rate of 28 lbs. to 56 lbs. per ton, but **do not use salt** as it stops bacterial action.

The difference between Pasture Hay and Ensilage may be briefly described by the following comparison. If Pasture Hay is compared with dried Peaches and Ensilage with canned Peaches, it will be recognised that in the former, the natural juices are removed, the bulk diminished and the digestibility reduced; while with Ensilage (canned Peaches), the bulk is not diminished, the natural juices are preserved and the digestibility increased.

Finally, **Ensilage** is a highly nutritious form of fodder which **can be used as required** when other feed is scarce; it **acts as a laxative** in the driest weather; it helps cows and ewes to give birth to young; and it materially **assists in preventing bloat** if fed to stock before turning into heavy, luscious green pastures such as Rape, Giant Colonial Cowgrass, etc. Some of the **most suitable plants for making into Ensilage** include Maize, Sudan Grass, Ambergane, Imphee, Saccaline, Lucerne, Cow Peas, Giant Colonial Cowgrass and Poa Aquatica, but practically every kind of green fodder can be advantageously used for this purpose.

CRIMSON OR ITALIAN SCARLET CLOVER

(*Trifolium Incarnatum*)

This is an annual species, quite distinct from both Cowgrass and Red Clover. The flowers are of a deep crimson and the plants attain a height of from 2 to 3 feet.

Seed is sown in the late Summer or Autumn, and the plants grow right through the Winter, finishing their season about late Spring. Crimson Clover is very palatable to stock and can be grazed, cut for green feed, made into ensilage or taken for a hay crop.

Sow the seed as early as conditions permit, using from 12 lbs. to 15 lbs. per acre. The plant also grows splendidly in association both with permanent Grasses and Clovers as well as with annuals. **Crimson Clover** and **Italian Ryegrass**, sown at the rate of 5 lbs. of the former to 25 lbs. of the latter, makes a splendid mixture for Winter and Spring feed, where a temporary ley is required.

The plant has nitrogen absorbing qualities and is also a soil improver, being very useful for ploughing under for green manure and also for using as an orchard cover crop. Berseem Clover is perhaps more suitable for districts with a mild Winter climate; but for temperate to cold localities, Crimson Clover, on account of its hardiness, is much to be preferred.



A Plant of Crimson Clover.

CLUSTERED CLOVER

(*Trifolium Glomeratum*)

A valuable native trefoil of creeping habit with small pinkish flowers, which, when once established, is very permanent, and propagates itself by re-seeding as well as by the creeping roots.

It is not adapted for sowing alone and is included in mixtures with other Grasses and Clovers for putting "bottom" in the pasture, and for this purpose is used at the rate of from 1 lb. to 3 lbs. per acre. Be careful to secure the true Clustered Clover, which is superior to and quite distinct from a number of the other native trefoils, several of which, however, very much resemble it in the appearance of the seed. **Brunning's Fancy** re-cleaned true Clustered Clover seed is the true strain and can always be relied on.

ENGLISH TREFOIL OR BLACK MEDICK

(*Medicago Lupulina*)

English Trefoil or Black Medick, also known as Hop Clover, is a fibrous-rooted biennial with bright yellow flowers slightly smaller than those of White Clover.

Except where the ground is devoid of Lime, English Trefoil grows freely on all classes of soil, and although a biennial, re-seeds itself so freely as to be practically permanent. English Trefoil yields nutritious herbage and may also be cut for hay, but is not the equal of the other Clovers in this respect.

It is not usually sown alone, generally being included in mixtures with other Grasses and Clovers, and grows well in association with Meadow Fox-tail, Sweet Vernal and Kentucky Blue Grass. In mixtures it is sown at the rate of from 1 lb. to 2 lbs. per acre, but in any case should be seeded sparingly as owing to its heavy growth, it is liable to smother out the Grasses and other Clovers. Sown alone, 20 lbs. of seed would be required for an acre. Seed may be sown from the first Autumn rains in March-April up to the end of June.

COWGRASS

(*Trifolium Pratense*)

The various terms used in connection with this plant are misleading and many farmers are confused with such expressions as Broad Red Clover, Red Clover, Perennial Red Clover, Giant Colonial Cowgrass, Montgomery Late-flowering Red Clover, etc. For easy classification, the species of *T. Pratense*, most generally in commerce, may be grouped as under:—

1. **Genuine Giant Colonial Cowgrass.**
2. **Montgomery Late-flowering Red Clover.**
3. **New Zealand Cowgrass.**
4. **Perennial Red Clover or Cowgrass.**

No comment is necessary regarding Nos. 1 and 2 as the Giant Colonial is fully dealt with on pages 74 and 75, while the Montgomery Late-flowering Red Clover is covered under Certified Pasture Seeds on Page 38.

Nos. 3 and 4 may be described as follows:—

New Zealand Cowgrass is an acclimatised form of the European biennial Red Clover or Cowgrass with generally longer permanency and a higher productiveness, but inferior in this respect to the Genuine Giant Colonial Cowgrass.



Perennial Red Clover or Cowgrass is the term usually used to describe the biennial Red Clover imported from Europe (principally from Poland) and which should only be sown where a temporary ley is required. It is not the equal of the other three types, either in permanency or in productiveness. This No. 4 type is what is sold as **Cowgrass, Prime Imported**.

The general cultivation details for all of these types of "Cowgrass" is the same, and for exact details the reader is referred to pages 74 and 75, where the particulars given fully under Giant Colonial Cowgrass apply equally to the other three. The differences in "Strain," however, are very marked.

WHITE CLOVER

(*Trifolium Repens*)

This species is the leading member of the *Trifolium* family under Australian conditions where rainfall and soil conditions permit its successful cultivation.

It is a high production plant requiring reasonable soil fertility and when once established is, with anything like fair treatment, in the matter of grazing, top-dressing, etc., thoroughly permanent either through the strain or by conditions being favorable for the plants re-seeding.

As there are several strains of White Clover now in commerce, a brief classification will be helpful. The following are the principal:—

1. **N.Z. Old Pasture (Government Certified Strain).**
2. **Wild White Clover (Kentish Strain grown in New Zealand).**
3. **N.Z. White Clover (uncertified).**
4. **White Dutch Clover (Imported from Europe).**

No. 1 refers to N.Z. Govt. Certified White Clover, the highest strain of all. This is dealt with fully on Page 37.

No. 2 is the Wild White Clover, originally discovered in Kent, in England, and is also discussed on Page 37.

No. 3 is the imported European strain of White Dutch Clover grown and saved in New Zealand. It is "uncertified" seed, and while it may be saved from old pastures, such pastures are "old" merely because conditions have been favorable for re-seeding and not on account of the perenniality of the strain. N.Z. White Clover (uncertified) is quite a good honest type and superior in production and permanency to the European White Dutch from which it sprang, but does not possess the special features or the perenniality of type of the N.Z. Old Pasture Certified strain as described on Page 37.

No. 4 is the ordinary White Dutch Clover usually imported from Poland which has been in use in this country for so many years. It lacks the special features of Nos. 1 and 2 and is inferior to these types both in perenniality and productiveness. This No. 4 type is the White Clover sold under the name of **Prime Imported**.

THE CONSERVATION OF SOIL MOISTURE

The Necessity of Humus in the Ground and the Importance of Cultivation.

The whole **secret of the conservation of moisture** in the soil may be clearly represented by taking a cube of ordinary loaf sugar and placing on top of it a heap of powdered sugar about a quarter of an inch deep. The solid sugar represents the soil and the powdered sugar the "soil mulch," which is obtained by harrowing, discing, or cultivating the ground.

Take a glass with a concave bottom, and dilute in water a few drops of writing ink, and place the cube of sugar in the fluid. You will notice how quickly the dark solution rises, and in a few seconds it has reached the top of the solid sugar, but there it stops. The "powdered sugar mulch" **does not take up** the liquid in the same way as the solid lump of sugar, and if you let the experiment stand, you will find it will take another hour or more for the dark liquid to soak through the powdered sugar. This simple test clearly demonstrates the whole secret of the conservation of soil moisture. By discing and harrowing, or to be brief, "cultivating" the soil to form a fine mulch, this powdered soil or surface mulch will act just like powdered sugar.

Soil ordinarily contains many passage-ways through which water quickly rises to the surface by what is termed "**Capillary attraction**," and this power of drawing up water from the lower strata towards the surface is one of the greatest importance from the Agriculturist's point of view. It is possessed, in a greater or lesser degree, by all soils being greater in proportion as the pores are finer. Sand possesses this power to the least extent and clay to the greatest, thus a **clayey soil is always wetter** than sandy ground placed under the same influences.



Regular Cultivation not only conserves the Soil Moisture, but keeps the ground well aerated and in a sweet, healthy condition. Practice regular cultivation in conjunction with efficient Top dressing and maintain your soil in a high state of fertility.

When the surface soil is left undisturbed, **unless the mulch covering** is provided by discing, harrowing or cultivating the ground to prevent the water rising quickly to the surface, the moisture will evaporate and the soil will bake, break and become hard, dry and unproductive. The **importance** of conserving moisture will be realised when it is understood that experiments have determined that it requires approximately **300 tons of water** to grow an average acre of corn, and this total does not take into account the water that is being constantly evaporated from the soil in which the crop is growing. This 300 tons represents only the moisture actually used by the plants themselves.

The **water holding capacity** of any soil **depends** on its composition and texture; the lighter a soil or the more sand it contains, the lesser water it will hold. The more humus a soil contains, the greater its water holding capacity, for humus is a vegetable sponge. The "**Conservation of Soil Moisture**" therefore depends on two factors, each of which are equally important.

1. **Thorough cultivation to preserve the "surface mulch."**
2. **A good supply of humus in the ground.**

Humus is necessary to take up the moisture and keep it from seeping into the lower levels beyond the reach of the plants and from running off the surface.

THE CLIMATIC CONDITIONS OF SO MANY PARTS OF AUSTRALIA DEMAND THE MOST THOROUGH AND CAREFUL CONSERVATION OF SOIL MOISTURE that the Agriculturist who learns to store moisture in his soil and to keep it there for the use of crops when they most need it, has solved one of the most important problems of crop production.

SUDAN GRASS

A Wonderful Drought-Resistant Summer Fodder and Hay Grass.

Sudan Grass is a highly drought resistant Summer-growing annual Sorghum which matures very quickly, the first crop being **ready to cut in from eight** to ten weeks after seeding, the time varying according to weather conditions. In a normal season it yields three cuttings, while in a very favorable year a **fourth cutting** may be taken or the last growth saved for seed. Sudan Grass stools freely and one plant will have as many as one hundred stems.

It is an annual with a short fibrous root and is killed out by frosts, although it can be **easily eradicated** at any time so that it is never likely to become a pest. In this respect it differs from the perennial Johnson Grass, which is difficult to get rid of on account of its underground root stocks or rhizomes.

UTILITY:—Brunner's Sudan Grass can be **grazed** (taking the usual precautions), **cut for green feed**, made into **ensilage**, saved for a **hay crop** or the last growth may be allowed to stand for a **seed crop**.



A Nice Crop of "Garawi" Sudan Grass.

For second and third class land and hill country, Wallaby Grass is one of the most valuable permanent pasture plants. Refer to page 42 for details of both the *Pilosa* and *Semi-annularis* varieties.

BLOAT:—There is **little danger** of "bloat" when reasonable care is taken, but this is essential with any green fodder. Any trouble may be eliminated by giving the animals some Lucerne or other hay to partially appease their hunger **before turning** in on the Sudan and by penning in small areas at a time. Stock in a ravenously hungry condition should not be allowed in on Sudan Grass or any other green fodder.

CLIMATIC NEEDS:—Sudan Grass is adapted to hot, dry districts with a fairly long Summer season. It can, however, be grown successfully in and around Sale and Maffra in Gippsland, but generally is more suited to the Northern areas of Victoria. It is one of the leading Summer fodders in N.S.W. and Queensland and is also fairly extensively grown in both South Australia and Western Australia.

SOIL PREPARATION:—The best results will be obtained on rich loam, but Sudan Grass has been **successfully grown** on almost **every class** of soil, from heavy clay to light sand. A rather firm seed bed gives the best results, but thoroughly **adequate drainage** is essential.

Plough the ground in the early Spring and harrow down to fine the soil as much as possible. Spring ploughing is **preferable** as it helps in warming the ground, and this is essential as cool or cold soil **delays** the germination of Sudan Grass seed. The most suitable fertiliser is **Superphosphate** at the rate of **112 lbs. to 140 lbs.** per acre according to the quality of the land.

SUDAN GRASS (Continued).

WHEN AND HOW TO SOW:—In Victoria, seed may be sown from the end of September up to early December, but in the Northern States, sowing may be continued as late as February. Sow as early as conditions permit, bearing in mind that the longer the growing season, the greater the possible yield. **Do not**, however, **sow while** the land is **cold**, otherwise the seed may hang in the ground and rot, or a poor strike with slow, stunted growth will be the result.

In very dry districts without irrigation, sow in rows 36 inches apart at the rate of from 3 lbs. to 4 lbs. per acre and cultivate frequently, or in broadcasting use 15 lbs. of Brunning's seed for the same area. Under irrigation or where reasonable Summer rainfall can be relied on, sow in rows 12 to 14 inches apart, using 8 lbs. to 10 lbs. per acre; if broadcasting under such conditions, use 20 lbs. to 25 lbs. of seed per acre.

When growing for hay, broadcast thickly at from 25 lbs. to 30 lbs. per acre, as thick seeding produces the best quality hay owing to the very much finer stems.

Where grown for hay in cultivated rows, Sudan Grass is apt to be a little coarse and not so desirable for marketing, but for home feeding, this will be little, if any disadvantage.



A Second Cutting of "Garawi" Sudan Grass, taken 4 weeks after the first. In this time the second growth reached 5 feet, with only one watering.

SUBSEQUENT TREATMENT:—Frequent cultivation is essential in dry districts to conserve the soil moisture, hence the necessity for sowing in rows. Seeding in this manner and **cultivating regularly** will, to a great extent, compensate for lack of moisture where irrigation is not available.

Brunning's Sudan Grass compared with the other Sorghums is comparatively harmless when grazed in the early stages of growth, and is utilised in this way by many successful growers without any loss or trouble, but it is always **advisable to take** every precaution. When the crop is growing steadily, try a beast or two of inferior value before letting the herd follow. Once Sudan Grass has reached the flowering stage, it is quite safe to pasture. The **chief danger** is when the early growing **crop** has been **stunted** in growth by frost or drought.

When **cutting for a seed crop**, allow the first heads to ripen fully as the stools mature somewhat later than the main stem and there is seldom any great loss from shattering.

SORGHUM POISONING:—Absolute safety with Sudan Grass may be ensured if the following points are borne in mind:—

- (1) Do not pasture off immature or stunted growth.
- (2) When grazing, only allow the stock on for a short period at first.
- (3) There is no danger when Sudan Grass is cut and allowed to wilt for two or three hours before being given to the animals.
- (4) Sudan Grass is quite safe to pasture once the flower head has shot.

FOR HAY:—Sudan Grass hay is of excellent quality. It can be chaffed and mixed with Oats, this association making excellent feed which is highly nutritious and palatable to all classes of stock. When **cutting for hay**, remember that the **time** of the highest nutritive value is just as the plants are coming into flower. **After this time**, the protein content decreases as the ripening progresses.

IMPHEE AND SACCALINE

Imphee or Planter's Friend and **Saccaline Sorghum** are so nearly similar in growth and all other characteristics, that they can be dealt with together in the one article.

Both are valuable as a stand-by for late districts, and both are **hardier to cold** conditions than any of the other Sorghums. There is very little difference in the appearance of the seed which in each case is of brownish color, the outer cover not being retained as with Ambergane.

A **special feature** of both plants (apart from lateness of maturity) is their **habit of ratooning or stooling out**; this occurs after each cutting so that the plants yield a number of good cuttings in a single season and **supply an enormous bulk** of first-class green fodder which, if desired, may be converted into ensilage.

UTILITY:—Both Brunning's Imphee and Saccaline may be **pastured** (taking the usual precautions), **cut for green feed** or made into **ensilage**, while the last growth may be **saved for seed**. A disadvantage of grazing is that possible damage from stock to future growths, is liable to reduce the yield. Imphee and Saccaline are **excellent for fattening** sheep, cattle, and other stock, and their **milk producing qualities** for dairy cows are already well-known and appreciated in Gippsland, the coastal districts of N.S.W. and elsewhere.

The usefulness of Imphee and Saccaline is during the late Summer and Autumn, but in some districts, the crop will also stand well into the Winter. Both possess high drought-resistance, and are available for use over a fairly long period of the year.



A splendid Crop of Imphee in Northern Victoria.

CLIMATIC NEEDS:—Imphee and Saccaline are **very adaptable** in this respect. They are suitable for hot, dry conditions, and have been grown successfully in Northern Victoria and other dry areas without irrigation. Both are very extensively grown in the Southern coastal districts of N.S.W. and both have proved highly payable crops in several parts of Gippsland.

SOIL PREPARATION:—Imphee and Saccaline can be grown profitably on **almost any class of soil**, from heavy clay to light sand, although the best results will be secured on rich loamy ground. Thorough and adequate **drainage is essential**, and a rather **firm seed bed** is requisite. Plough the land in the early Spring and harrow down well so as to provide as fine a seed bed as possible. Spring ploughing is advised as it assists in warming the ground, and this is very necessary as the **seed may hang in the ground** and rot, and certainly will not germinate well when the soil is too cold.

Superphosphate at the rate of from **112 lbs. to 140 lbs.** per acre is the most suitable fertiliser, the quantity depending on the class of land being sown down.

WHEN AND HOW TO SOW:—In most parts of Victoria, seed may be sown **from early in October** up till the beginning of January, but in N.S.W. and Queensland, sowings may be made as late as the second week in February. Owing to the longer growing period available, the earlier sowing is completed the greater the yield, but **on no account sow while the soil is cold**, as under such conditions the seed is liable to hang in the ground and rot, or even should it strike, poor stunted growth will be the result.

In very dry districts without irrigation, sow in drills 30 inches apart, at the rate of **4 lbs. to 5 lbs.** per acre, or if broadcasting use **15 lbs.** per acre. Where ample moisture is available, either from Summer rainfall or irrigation, use from **8 lbs. to 10 lbs.** in drills 12 to 14 inches apart, or if broadcasting, sow from **20 lbs. to 25 lbs.** per acre.

IMPHEE AND SACCALINE (Continued).

SUBSEQUENT TREATMENT:—In dry districts without irrigation, **frequent cultivation is necessary** to conserve the soil moisture, and any shortage in this direction can to a great extent be remedied by regular cultivation.

Provided the **fodder is allowed to lie and wilt** in the sun for two or three hours, Imphee and Saccaline may be cut and fed green at any time, but owing to the possibility of Sorghum poisoning, the plants **should not be grazed** until the flowering period. In the early stages growth is slow, but once established speedy headway is made, and several cuttings will be obtained in a Season, while in districts with a mild Winter, the plants may stand right through until the early Spring.

IMPHEE AND SACCALINE:—So far as our investigations go, the **difference between Imphee and Saccaline is very slight**. The latter is said to be an improved form of Imphee, but the two plants are very much alike, and any differences are too small to justify extensive reference. Some say that Saccaline retains its sugar content better than Imphee; others prefer to use Imphee in the early Autumn and Saccaline for early Winter feed.

Imphee is reported to give a greater yield than Saccaline taken over the full period of its growth, but on the other hand it is said that Saccaline is easier to handle, owing to its method of growth, and that it is quicker in reaching maturity than Imphee. These remarks are submitted **without responsibility**, and as a matter of interest, as in our opinion the difference is too slight to really be considered.

FOUR ESSENTIALS OF SUCCESSFUL SOIL MANAGEMENT ARE:—

1. Soils must be properly drained to be most productive.
2. The supply of humus in the ground must be maintained.
3. The soil must be kept sweet by regular applications of lime to secure the maximum crop products.
4. Plant food must be abundant and properly balanced if the best crops are to be produced.

COW PEAS

Cow Peas can be grown successfully wherever Sudan Grass does well, and as fairly warm conditions are required, are **most suitable** for the Goulburn Valley, Northern Victoria and the Riverina. The plant is more drought-resistant than Maize and nearly equal in this respect to Sudan Grass. Cow Peas are **indeterminate** and **continue growing** producing leafage and green pods until killed by frost.

UTILITY:—Cow Peas may be **grazed or cut for green feed**; they yield a **hay crop** of first-class quality and are also most valuable as a **soil improving plant** for ploughing under for green manure, adding large quantities of nitrogen and humus to the soil, and thereby increasing its general fertility.

SOIL:—The plants are not exacting in their soil requirements, but require **well-drained ground**. Prepare the land in the same way as for Maize and where possible, fallow in the Autumn and plough in the Spring, following this with a harrowing, disking and rolling.

SEED SOWING:—Sowing **too early** may result in the seed rotting in the ground, or in event of a late cold spell, destruction of the young plants by frost, and the **middle of October** is quite early enough. The most economical way is to **drill in rows 3 feet apart** to permit of cultivation, when from **20 lbs. to 25 lbs.** of seed will be required for an acre. Seed may also be **broadcasted** at the rate of from **90 lbs. to 120 lbs.** per acre.

As a Summer drought-resistant plant, the **highest yields** of fodder, hay and seed will be secured by **sowing in wide rows** to permit of the necessary cultivations of the growing crop to retain that soil moisture necessary to enable the plants to thrive and reach maturity.

GENERAL TREATMENT:—Frequent treatment to **conserve the soil moisture** and to destroy the weeds in the earlier growing stages, is the only treatment necessary. This is, of course, only possible when the plants are grown in rows.

SOIL IMPROVEMENT:—Cow Peas are especially valuable for soil improvement and **cannot be too highly regarded** in this respect. The thick stems during the growing period smother the weeds and thus **cleanse the ground**. The crop may be pastured or cut for green feed and the last growth ploughed under for green manure. The **best time** for this operation is when the pods are thoroughly ripe.

FOR HAY:—When grown for hay, **do not cut** the crop until the first pods are ripe or even a little later. When planted in 3-foot rows, the vines support each other, so that they can be cut with an ordinary mower, to which a bunching attachment should be added. The plants have succulent leaves and thick stems and require **care in curing**, except in very favorable weather.

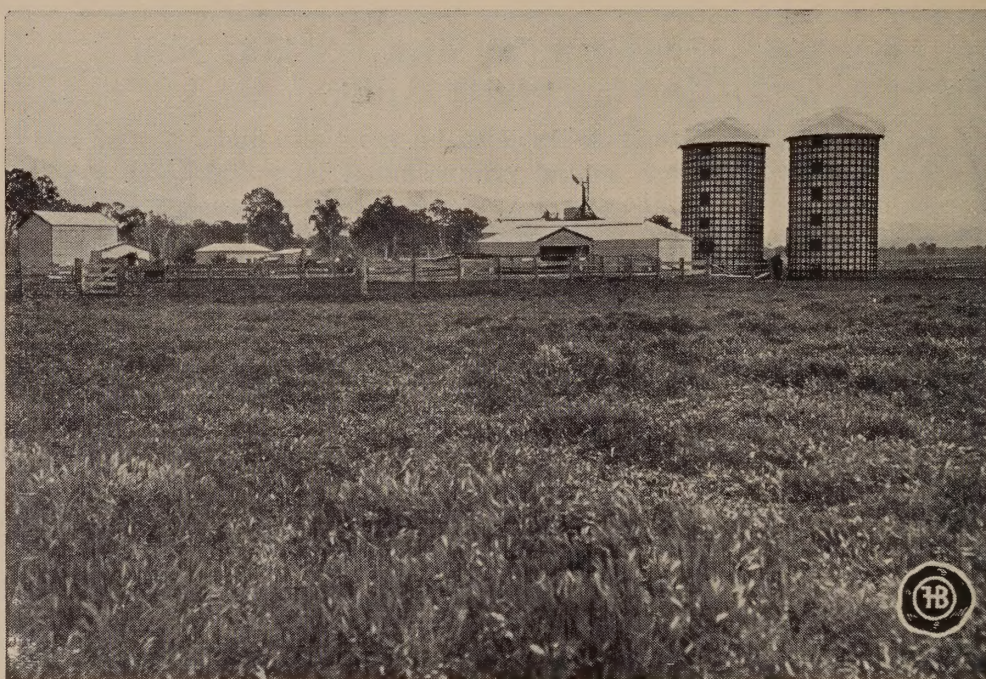
JAPANESE MILLET

This drought-resistant annual Summer fodder, known in America as Barnyard or Billion Dollar Grass, provides fodder during the late Spring, Summer and Autumn. Japanese Millet can be successfully grown over a very wide scope of climate ranging from warm areas, such as Kerang and Macorna, in Victoria, to colder localities as far south as Hobart, in Tasmania. While it will not withstand frost, it is reasonably hardy to a certain amount of cool weather, and is therefore valuable for districts with a short Summer season like Gippsland.

UTILITY:—Japanese Millet can be **pastured, cut and fed green**, made into **ensilage** or saved for **hay**, while the last growth may be allowed to run to **seed**. The principal use is for grazing when it is most valuable for providing feed during a dry Summer. There is practically no danger from "bloat" with Japanese Millet.

When cutting to feed green, allow Japanese Millet to **lie and wilt** for two or three hours before feeding to stock, especially dairy cows. The **hay should not be fed** to horses **by itself** but mixed with oaten hay, when it is rendered non-injurious and makes a fine mixture of high feeding value.

SOIL REQUIREMENTS:—The ground must be well worked and a fine firm seed bed prepared, otherwise Japanese Millet is very adaptable, and does well on most classes of soil, excepting very heavy ground and low-lying land inclined to excessive moisture. The most suitable fertiliser is Superphosphate at the rate of 112 lbs. to the acre.



A Drought Insurance. A crop from Brunning's "Standard" quality Japanese Millet Seed.

WHEN AND HOW TO SOW:—The **secret of success** in growing Millet is shallow seeding and **sowing only** when the ground is warm. With shallow surface soils, deep sowing is not advisable, and where the ground is loose and open, **rolling before seeding** is very essential.

Do not sow too early, nor too deep, from 1 to 1½ inches being quite sufficient depth. Seed put down too deep or sown too early in cold ground will only go mouldy, the result being, if any, a very poor germination.

Seed may be sown either in drills or broadcasted, the time depending on the conditions of the season. From the **end of September** onwards is generally safe, and sowings may be continued until early in January.

Sowing in drills 7 inches apart, from **8 to 10 lbs.**, or broadcasted from **15 to 20 lbs.** of Brunning's M/Dressed and Graded seed is required per acre. These figures apply to Brunning's best quality, and larger quantities per acre must be allowed for, where Farmer's Dressed and lower grade seed is being used. **When grown to be cut** for green feed, hay or ensilage, and sown in rows 15 inches apart, use from **6 to 7 lbs.** of seed per acre.

SUBSEQUENT TREATMENT:—Seeded at the right time, Japanese Millet grows very quickly and can be eaten off in from five to six weeks after sowing. When only intended for grazing, pasture when the plants are about 6 inches high, feeding down fairly close, as this tends to **make them stool out** and become much thicker. After being pastured, take the stock off the paddock, and where irrigation is available, apply the water.

Then, if convenient, **harrow the paddock** with a set of sharp harrows across the drills, and allow the crop to again grow to a height of 8 to 10 inches, at which stage it can be further pastured. With this treatment Japanese Millet can be kept growing throughout the Summer and will carry from 10 to 15 sheep per acre. Harrowing is **necessary at least three times** during the season, and the increased growth of the crop will show the benefit of this operation.

JAPANESE MILLET (Continued).

Do not keep stock **too long on any one paddock**, as this means less actual growth as well as the trampling down of the Millet, whereas by sub-dividing up into three or four paddocks the intervals of rest soon restore any damage done in this way.

When grown in 15 inch drills to be cut for green feed, hay or ensilage, **work the scuffler between the rows** until the Millet is about 3 feet high. Cut well before the seeding stage and down to **not more than 4 inches** from the ground. This is important as lower cutting is **liable to kill** some of the plants.

After the second cutting, the crop may be left to seed; if intended **for hay** however, do not allow it to go too far, otherwise the plants will become woody, fibrous and indigestible. The **best time** for cutting Japanese Millet **for hay** is just before the flowering stage.

Cut the crop with a binder, making into small sheaves loosely tied, so as to allow of drying without becoming mildewed. Stook in rows, not too thickly, after which it can be stacked similarly to Oats or Wheat.



Japanese Millet at Eskdale. From the "Commonwealth Agriculturist," by courtesy of Commonwealth Fertilisers and Chemicals Ltd.

METHODS OF SEED TESTING

The difference between the Irish or Belfast and the Continental or Swiss systems of seed testing.

IRISH SYSTEM:—Under the **Irish** or Belfast system, **all grains** are regarded as **pure seeds**, and in the case of grasses, the **empty glumes** are **not counted** as impurities, so that under the Irish system the percentage of **purity** on an average quality line of seed, is generally **fairly high**.

With the **germination**, the position is the reverse, as in making the test the empty glumes and damaged seeds are included with the pure seeds. The **advantage** of this system, however, is that the germination **represents what the Farmer may expect** from sowing in the field, as under such conditions all inert matter, damaged seeds, etc., are included.

CONTINENTAL METHOD:—In arriving at the **purity**, **only those seeds** which are considered **capable of germination**, are called pure seeds. Empty glumes, badly shrivelled seeds, broken and damaged grains, are regarded as impurities or inert matter, and consequently the percentage of **purity with the Continental method is low** compared with the Irish system.

With the **germination**, however, **only the pure seeds** are **germinated** and this naturally gives a **much higher percentage** than with the Irish system.

It seems that neither method is ideal—i.e., thoroughly representative from the Farmer's point of view.

GENERAL:—From a purity standpoint the Irish system is misleading, and the **Continental method** of counting only the pure, perfect seeds and regarding broken grains, empty glumes, etc., as impurities or inert matter, is **more thoroughly representative**, although the percentage of purity may appear much lower than with the Irish system.

On the other hand, the **germination** result **under the Continental method** is equally **misleading** because it only represents the percentage of pure, perfect seeds, and **does not take into account the impurities** which will not germinate, although part of the seed actually sown, and in this respect the **Irish system** conveys a much **better impression** of the germinating value of any line of seed.

The **Continental method** appears to be the better system and when tests are quoted on this basis, the **actual germinating value** of the seed may be arrived at by multiplying the purity and germination together and dividing by one hundred. For example, a **purity of 90 per cent.** and a **germination of 80 per cent.** shows the actual value as **72 per cent.**—i.e., 90×80 which divided by 100, gives a net result of 72.

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